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# IMF Working Paper

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Revisiting the Link between Trade, Growth and Inequality:  
Lessons for Latin America and the Caribbean

by Kimberly Beaton, Aliona Cebotari, and Andras Komaromi

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I N T E R N A T I O N A L M O N E T A R Y F U N D

**IMF Working Paper**

Western Hemisphere Department

**Revisiting the Link between Trade, Growth and Inequality: Lessons for Latin America and the Caribbean<sup>1</sup>****Prepared by Kimberly Beaton, Aliona Cebotari and Andras Komaromi**

Authorized for distribution by Valerie Cerra

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**Abstract**

We revisit the relationship between international trade, economic growth and inequality with a focus on Latin America and the Caribbean. The paper combines two approaches: First, we employ a cross-country panel framework to analyze the macroeconomic effects of international trade on economic growth and inequality considering the strength of trade connections as well as characteristics of countries' export markets and products. Second, we consider event studies of past episodes of trade liberalization to extract general lessons on the impact of trade liberalization on economic growth and its structure and inequality. Both approaches consistently point to two broad messages: First, trade openness and connectivity to the center of the trade network has substantial macroeconomic benefits. Second, we do not find a statistically significant or economically sizable direct impact of trade on overall income inequality.

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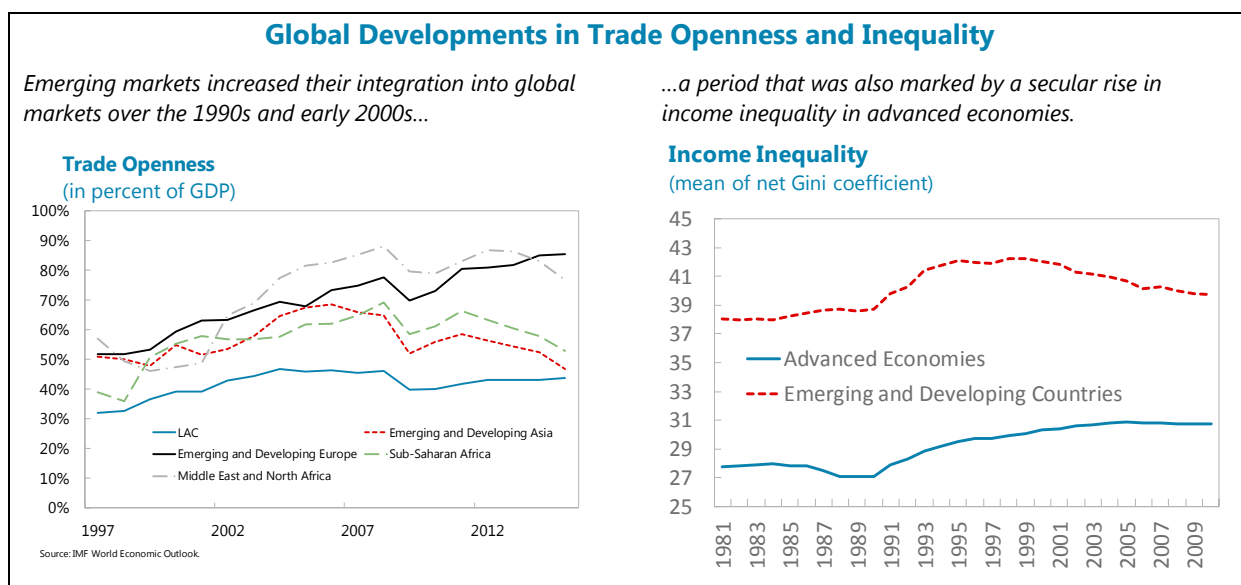
<sup>1</sup> Xiaodan Ding provided excellent research assistance. Valerie Cerra and participants in the WHD Seminar provided helpful comments and suggestions. This paper was prepared as a background study for the Western Hemisphere Department's Cluster Report on Trade Integration in Latin America and the Caribbean.

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## I. INTRODUCTION

**A renewed focus on trade integration in Latin America and the Caribbean (LAC) may present an opportunity to leverage trade for economic growth.** Weaker external demand and the sizeable slump experienced by LAC's commodity exporters, combined with idiosyncratic challenges faced by several economies, have slowed growth and contributed to a weaker outlook for the region. At the same time, despite accounting for about 8 percent of global economic activity, the region accounts for only about 5 percent of global exports of goods and services and LAC's trade openness accounts for only about 44 percent of regional GDP, well below that of other emerging market regions. While the region liberalized trade in the late 1980s and early 1990s, its openness has remained relatively stable since the beginning of the 2000s. In this context, enhanced trade integration may present an opportunity to leverage trade for economic growth.

**At the same time, deepening trade integration has emerged as a popular explanation for rising inequality.** Advanced economies have seen a rise in protectionist sentiment as trade integration and, more broadly, globalization have been blamed for a rise in income inequality. This sentiment has been supported by the secular rise in income inequality in advanced economies, which coincided with many emerging markets liberalizing trade in the 1990s and later, the entry of China into global markets marked by its accession into the World Trade Organization (WTO) in 2001. As income inequality in LAC is already among the highest across regions, the question is whether LAC can enhance growth through trade integration without magnifying the existing gap in the income distribution.



**The impact of trade integration on economic growth has been the subject of a deep literature.** Given the likely endogeneity between trade and economic growth, the debate has focused on the appropriateness of various methodologies to control for endogeneity and the consequential impact of the estimation choice on the estimated relationship between trade and economic growth. A seminal contribution by Frankel and Romer (1999) found that trade, instrumented with geography, has a positive effect on countries' income. These findings were disputed by others including Rodríguez and Rodrik (2001) who questioned the instrument

choice. Nevertheless, the impact of trade integration on economic growth remains under debate with more recent papers tending to find an important role for trade in economic growth (see Dollar and Kraay (2004), Loayza and Fajnzylber (2005), de la Torre et al (2015) for example).

**Similarly, the distributional effects of trade shocks have been studied extensively both in advanced and emerging economies.** For advanced economies, papers analyzing data up to the early 1990s tended to find no or negligible effects of trade on employment and wage inequality (Wood, 1995). However, more recent studies that focus on the past two decades, a period often characterized by the “China shock”, tend to find more pronounced negative distributional effects (Autor, Dorn, and Hanson, 2013; Hummels, Jørgensen, Munch, and Xiang, 2014). For developing economies, several micro studies have shown that increased openness raised the relative demand for skilled labor contributing to the increase in income inequality. Since this finding is inconsistent with the workhorse Heckscher–Ohlin model of international trade, researchers explored alternative mechanisms such as trade in intermediate goods, trade-induced skill-biased technological change and skill complementarity with capital as potential explanations for the divergence (Goldberg and Pavcnik, 2007). Goldberg (2015) provides an extensive survey of the country-level evidence from both developed and developing economies.

**This paper revisits the relationship between international trade, economic growth and inequality with a focus on Latin America and the Caribbean.** The paper combines two approaches to assess these complex relationships. First, a cross-country panel framework is used to analyze the macroeconomic effects of international trade on economic growth and inequality. To provide additional insight into how the region can best structure its trade policy to maximize the growth benefits of trade, the importance of countries’ trade characteristics in terms of its connections, participation in global value chains (GVCs) and export markets and products are considered in addition to standard trade openness. Second, event studies of past episodes of trade liberalization are considered to extract general lessons on the impact of trade liberalization on economic growth and its structure and inequality.

**Trade integration can promote economic growth without adversely affecting income inequality.** The two methodologies used to assess the relationship between trade, economic growth and inequality consistently point to two broad messages. First, trade openness and connectivity to the center of the trade network has substantial macroeconomic benefits. Second, it is hard to find a statistically significant or economically sizable direct negative impact of trade on inequality. These results point to an opportunity for LAC to leverage trade integration to promote economic growth without adversely affecting elevated income inequality. Enhancing trade integration both inter- and intra-regionally will help to maximize the region’s growth benefits from trade. However, in the context of rising protectionist sentiment globally, particularly in advanced economies, regional integration may currently present the greatest opportunity for the region to strengthen the growth dividends of trade integration. Policies to promote participation in global value chains, such as improvements in infrastructure, a strengthening of human capital and putting in place supportive policies for research and development, are also desirable given the knowledge and technology spillovers from participation in these chains that can enhance the growth benefits of trade. Finally,

policies to support export quality and promote export diversification can facilitate further gains from trade.

**The remainder of this paper is organized as follows.** Section II discusses the methodologies and associated data. Section III presents the results and Section IV concludes.

## II. METHODOLOGY AND DATA

**We combine two distinct empirical approaches –cross-country panel regressions and event studies – to revisit the link between trade, economic performance and inequality.** Both methods have distinct advantages and disadvantages for identification. The cross-country panel framework allows us to examine data for a large number of countries and long time periods while controlling for non-trade determinants and unobserved country-specific factors. However, our regressions may suffer from endogeneity problems that make it hard to identify the causal links. Therefore, we complement the regression analysis with event studies of major trade liberalization episodes which provide natural experiments for the effect of large trade policy changes. The event-study approach attempts to mitigate the identification problem by considering only episodes when countries implemented large changes in their trade policies. An advantage of this approach is that the researcher can be confident that there was an exogenous change in the independent variable. However, as significant trade reforms are usually part of a broader policy package, the approach cannot ascertain whether the observed effects are strictly caused by trade opening or accompanying policies. This omitted variable problem is an important caveat for interpreting our results. Utilizing multiple approaches can help to mitigate the disadvantages of each methodology when drawing policy conclusions as we carefully check whether our results convey a consistent message across methodologies.

### A. Cross-Country Panel Regressions

#### Growth

**The impact of trade and its characteristics on economic growth is assessed using a standard growth model.** The benchmark regression specification is:

$$y_{i,t} - y_{i,t-1} = \beta_1 y_{i,t-1} + \beta_2 \mathbf{CV}_{i,t} + \beta_3 OP_{i,t} + \mu_t + \gamma_i + \epsilon_{i,t} \quad (1)$$

where  $y_{i,t}$  is the log of GDP per capita for country  $i$  at time  $t$ ;  $\mathbf{CV}$  is a set of control variables;  $OP$  is trade openness;  $\mu_t$  are unobserved time-specific effects;  $\gamma_i$  are unobserved country-specific effects; and  $\epsilon_{i,t}$  is the error term.<sup>2</sup> The set of control variables is standard and includes human and physical capital as well as foreign direct investment as a share of GDP and the terms of trade.<sup>3</sup>

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<sup>2</sup> Trade openness is used as our benchmark measure of trade integration given its broad availability across countries and across time. The event studies around trade liberalization episodes can be considered a robustness check of the results based on this standard measure.

<sup>3</sup> A broader measure of financial openness was considered in lieu of foreign direct investment, but was insignificant in the benchmark specification.

**The benchmark regression specification is extended to assess how the characteristics of trade integration influence growth outcomes.** Following de la Torre et al. (2015), the augmented regression is:

$$y_{i,t} - y_{i,t-1} = \beta_1 y_{i,t-1} + \beta_2 CV_{i,t} + \beta_3 OP_{i,t} + \beta_4 TC_{i,t} + \mu_t + \gamma_i + \epsilon_{i,t} \quad (2)$$

where  $TC$  is a set of trade characteristics. This set-up allows us to infer the growth impact of different trade characteristics, while controlling for the level of trade integration.

**The trade-growth regressions are estimated using system generalized method of moments (SGMM).** As is standard in the literature, the trade-growth regressions are estimated using non-overlapping 5-year averages. As such, the dependent variable is the average rate of real per capita GDP growth. The trade-growth regressions are dynamic, including the level of per capita GDP at the start of the corresponding period in the set of explanatory variables to capture conditional convergence effects.<sup>4</sup> Given the dynamic nature of the regressions, the estimation strategy needs to address the dynamic panel bias that could result. Another challenge for estimation is that most explanatory variables are likely to be jointly endogenous with economic growth. To address these estimation challenges, we follow recent contributors to the trade-growth literature (see Dollar and Kraay (2004); Loayza and Fajnzylber (2005); Chang et al (2009); de la Torre et al. (2015)) and use the SGMM method developed in Arellano and Bover (1995) and Blundell and Bond (1998).<sup>5</sup>

**SGMM estimates a system of equations to help mitigate the estimation challenges presented by equations (1) and (2).** The methodology is a system of two linear instrumental variables regressions. The first regression relates growth rates to levels of explanatory variables as in equation (1), while the second relates changes in growth rates to changes in explanatory variables. Differencing the regression controls for unobserved country-specific effects. However, by construction the error term of the equation in differences is correlated with the lagged dependent variable. SGMM uses internal instruments (i.e. previous values of the dependent and explanatory variables) to address this correlation as well as the endogeneity of the explanatory variables. This assumes that shocks to economic growth be unpredictable given past values of the explanatory variables but does allow for current and future values of the explanatory variables to be affected by growth shocks. For the equation in levels, the instruments are given by the lagged differences of the explanatory variables. For the equation in differences, the instruments are lagged observations of both the explanatory and the dependent variables. The instruments are appropriate under the assumption that the correlation between the explanatory variables and the country-specific effect is the same for all time periods.

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<sup>4</sup> That is, that more developed countries typically grow more slowly than less developed ones as in neoclassical growth models (e.g. Solow 1956).

<sup>5</sup> GMM estimators for dynamic panel data models were introduced first by Holtz-Eakin et al (1988) and Arellano and Bond (1991) and were later extended in Arellano and Bover (1995) and Blundell and Bond (1998). Caselli, Esquivel and Lefort (1996) first applied system GMM in the cross-country growth literature.

**The instrument set is restricted to avoid over-fitting bias.** As the set of instruments grows with the number of explanatory variables and time periods, a restricted set of moment conditions is used to avoid overfitting bias (see Arellano and Bond 1998). We use as instruments only the first and second appropriate lag of each explanatory variable. For the variables measured as period averages, the instruments correspond to the average of periods  $t-2$  and  $t-3$ . For the variables measured as initial values only the first appropriate lag is used, corresponding to the observation at the start of period  $t-1$ . As a consequence, and following de la Torre et al (2015), in the estimations of equation 2, the characteristics of trade connections are included in the trade-growth regressions one at a time to avoid overextending the number of required instruments.<sup>6</sup>

**Specification tests are used to assess the validity of the instruments and serial correlation in the error term.** As the consistency of the SGMM estimates depends on the validity of the instrument set, its validity is tested using the Hansen test of over-identifying restrictions. Second, we test of second-order serial correlation in the first differenced error term. First-order serial correlation is expected even if the original error term (in levels) is uncorrelated. Second-order serial correlation would reject the appropriateness of the proposed instruments, suggesting that higher-order lags may be needed as instruments. We also conduct robustness checks to confirm that our results are robust to different instrument sets. These estimates (not reported) generally confirm our baseline results.

**The trade-growth regressions are estimated for a large unbalanced panel dataset.** 131 countries are included in the benchmark specification. Annex 1 provides detail on the data used for each variable in the regressions.

## Inequality

**The impact of trade on inequality is assessed by linking movements in countries' Gini coefficients, measured on both a market and net basis, with a set of explanatory variables:**

$$GINI_{i,t} = \beta_1 + \beta_2 CV_{i,t} + \beta_3 OP_{i,t} + \mu_t + \gamma_i + \epsilon_{i,t} \quad (3)$$

where  $GINI_{i,t}$  is either the market or net Gini coefficient, both are considered in all specifications. The approach follows closely that of Jaumotte, Lall, and Papageorgiou (2013) and Dabla-Norris et al. (2015). The vector of control variables,  $CV$ , includes variables to capture the impact of other aspects of globalization as well as the importance of education and government redistributive policy. Financial globalization has been linked to income inequality given that foreign assets and liabilities tend to be concentrated in high-skill and technology intensive sectors, increasing the wages of the high-skilled. Financial openness, on the other hand, may have either a positive or negative effect on inequality as it tends to be accompanied by more inclusive financial systems, but may also disproportionately benefit higher income households with greater access, particularly in the early stages of financial

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<sup>6</sup> In some specifications the number of instruments is close to or larger than the number of countries in the sample. In these cases, a restricted set of control variables is considered to reduce the number of explanatory variables.



development. A proxy for government redistributive policy is also included as governments, particularly in advanced economies, use public policy (including progressive tax systems and social transfers) to mitigate inequality. The impact of education could theoretically be positive or negative depending on the return to education. Finally, the shares of agriculture and services in value-added are included as additional control variables.<sup>7</sup>  $\mu_t$  are unobserved time-specific effects;  $\gamma_i$  are unobserved country-specific effects; and  $\epsilon_{i,t}$  is the error term.

**We also investigate whether the impact of trade openness on inequality varies depending on the level of economic development or location.** The benchmark inequality regression is supplemented with interaction terms to assess these potential effects:

$$GINI_{i,t} = \beta_1 + \beta_2 CV_{i,t} + \beta_3 OP_{i,t} + \beta_4 X_{i,t} + \beta_5 X_{i,t} OP_{i,t} + \mu_t + \gamma_i + \epsilon_{i,t} \quad (4)$$

where  $X_{i,t}$  is either a dummy variable for advanced economies or for LAC depending on the specification. The coefficient  $\beta_5$  on the interaction terms denotes the marginal impact of the level of economic development or location on the impact of trade openness on inequality.

**As with the growth regressions, equation 3 and 4 are estimated using a large unbalanced panel dataset.** 118 countries are included. Equations 3 and 4 are estimated using panel fixed effects with five-year panels over 1980-2013 and robust standard errors clustered at the country level. Annex 1 provides detail on each variable in the regression.

## B. Event Studies

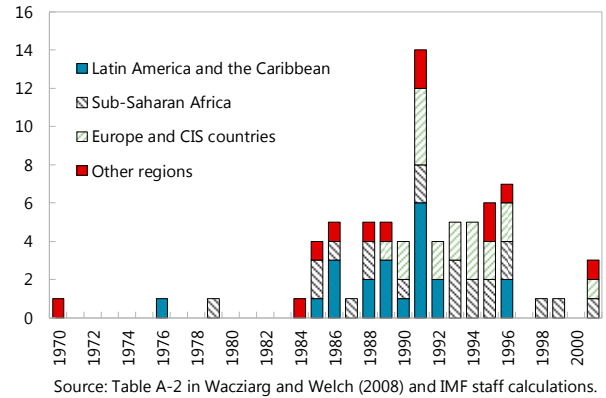
**Studying large and distinct trade liberalization episodes provides an alternative way to gauge the effect of trade openness on economic outcomes.** The literature has identified major shifts in trade policy towards greater openness. In their seminal study on the growth effects of trade policies, Sachs and Warner (1995) compiled a list of liberalization dates between 1950 and 1994 for a large number of countries. In principle, these liberalization dates were based on five quantitative variables: the average tariff rate, the share of goods covered by nontariff barriers, the black market exchange rate premium, the presence of state monopoly on major exports (export marketing boards) and a socialist economic system. However, data limitations and lack of consistency in the definitions of the available measures of trade restrictions across time periods often forced the authors to rely on secondary sources of trade policies. Wacziarg and Welch (2003, 2008) systematically reviewed the Sachs-Warner dates in light of new data published since the original study and conducted a comprehensive survey of country case studies of trade liberalization. Their updated and extended dataset covers 140 countries between 1950-2001.

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<sup>7</sup> Following Dabla-Norris et al (2015) we also considered a measure of labor market flexibility based on data from the World Economic Forum that measures the extent to which regulations govern firing and hiring, collective bargaining, and minimum wages. However, the variable was insignificant and hence omitted from the final specification.

**We rely on 74 trade liberalization episodes between 1970 and 2001 to trace out the average effect of trade opening.**<sup>8</sup> Due to data limitations, we focus our attention to the Sachs-Warner-Wacziarg-Welch (SWWW) liberalization dates after 1970. Most of these episodes are related to the wave of trade liberalization in Latin America and Africa from the mid-1980s to the mid-90s as well as the opening of the post-soviet and post-communist countries in the early 1990s. We exploit the timing of liberalization in a within country setting to assess the effect of discrete trade policy changes: First, we examine the time path of measures of economic performance, economic structure and inequality for an average country before and after liberalization, and compare it to the world average.<sup>9</sup> Second, we run simple regressions of the same variables on a binary liberalization indicator, defined by the dates of liberalization:

**Liberalization episodes by region**



$$Y_{it} = \alpha_i + \beta_t + \gamma LIB_{it} + \varepsilon_{it}, \quad (5)$$

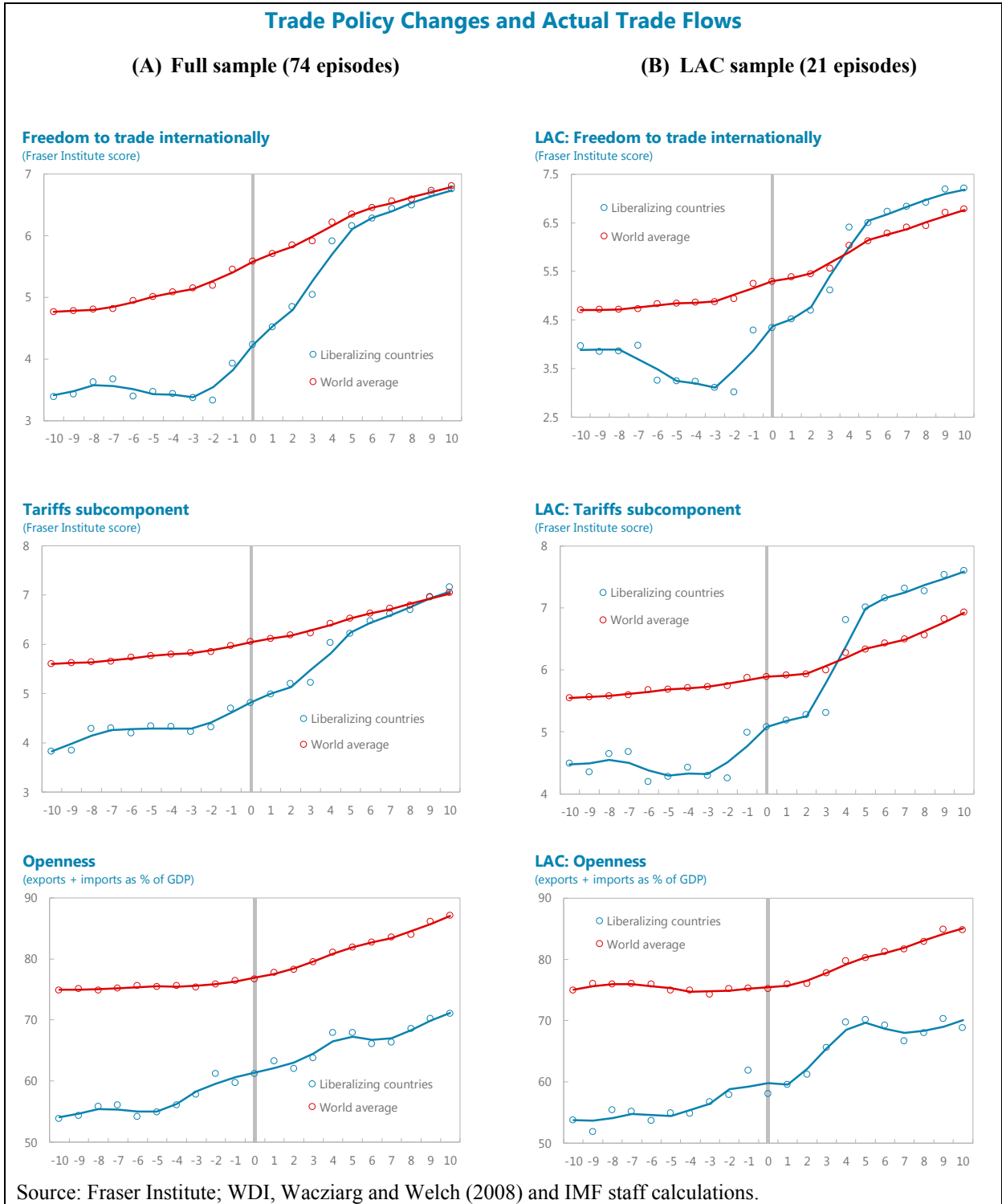
where  $Y_{it}$  is the relevant outcome variable (growth, volatility, inequality, etc) in country  $i$  at time  $t$ , and  $LIB_{it}$  is 1 if  $t$  is greater than the year of liberalization and 0 otherwise. The  $\alpha_i$  and  $\beta_t$  terms are country and time fixed effects, respectively.

**The SWWW dates align well with sharp changes in trade policy and an increase in actual trade flows, validating our event study approach.** The evolution of the Fraser Institute's Freedom to Trade Internationally Index (FTI) is a useful comparison to the SWWW trade liberalization dates. The FTI, a composite measure based on tariff rates, regulatory barriers and other non-tariff barriers, ranges between 0 and 10, with higher scores indicating a more open trade policy. Both the overall index and the subcomponent based on tariffs show a marked increase in liberalizing countries with a noticeable break around the SWWW date. The typical liberalizing country started from a relatively low level of the FTI, but it reached or surpassed (in the case of LAC) the world average within 10 years of liberalization. This consistency is supportive of the appropriateness of the SWWW trade liberalization dates to measure discrete shifts in trade policy. Despite the discrete changes in trade policy, openness follows a more

<sup>8</sup> Using specific liberalization dates to study trade shocks is similar in spirit to papers that identify discrete shifts in monetary policy to isolate the causal effect on the macro economy (Friedman and Schwartz, 1963; Romer and Romer, 1989).

<sup>9</sup> The world average is an imperfect control group as other countries may liberalize their trade policies in the event window. However, under the null hypothesis that trade opening does not influence economic performance or inequality, one should not see different trends between liberalizing countries and the world average.

gradual upward trend on average following trade liberalization, although the effect seems to be more pronounced for LAC episodes.<sup>10</sup>



<sup>10</sup> Even absent effects on actual openness, liberalization could still have effects on economic outcomes, through pro-competitive effects or technological transfers, for example.

### III. ECONOMIC AND SOCIAL IMPACT OF TRADE

**The economic and social impact of trade, with a focus on LAC, is examined in this section.** We focus first on the impact of trade on economic performance and then, in a subsequent section, on income inequality. In each section, we report the results of our cross-country panel regressions as well as the complementary event study approach.

#### A. Trade and Economic Performance

##### Growth Regressions: Openness and Trade Characteristics

**Trade openness is beneficial for economic growth.** The results of the benchmark specification (column 1, Table 1) are broadly comparable to those in the literature: trade openness has a positive and statistically significant impact on average per capita economic growth. There is evidence of a conditional convergence effect whereby countries with a lower initial level of real GDP per capita have higher average growth rates. As expected, the coefficient on labor force education, included to capture the degree of human capital development, is positive, although not statistically significant, while the coefficient on public infrastructure is positive and statistically significant. Finally, the terms of trade have an adverse effect on real per capita growth outcomes, while foreign direct investment has a positive, but not statistically significant impact. Results from the second order serial correlation test indicate that there is no serial correlation in the error term, while the results of the Hansen test of over-identifying restrictions on the full set of instruments confirm the validity of the instrument set.

**The characteristics of countries' trade may be important for explaining the relationship between trade and economic growth.** The effect of trade on growth varies with the level of economic development. Including an advanced economy dummy variable in the baseline regression and interacting it with trade openness (column 2, Table 1) suggests the impact of trade openness on economic growth is stronger for advanced countries relative to countries at earlier stages of development.<sup>11</sup> This is consistent with findings in the literature that the beneficial effects of trade increase as economies develop and strengthen complementary policies that allow them to reap the benefits of trade (e.g. D.H. Kim 2011). Among other policies, these may include policies to strengthen human capital and physical infrastructure as well as to improve institutional frameworks and support investment. However, our results suggest that the economic gains from trade may not be related to countries' relative levels of human capital development and quality of infrastructure. Including interaction terms between the labor force education and trade openness and public infrastructure and trade openness variables (column 4, Table 1) yields insignificant results. There is also some evidence that the economic impact of trade differs by region. For LAC, the results suggest a stronger

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<sup>11</sup> The results of the Hansen test of over-identifying restrictions are indicative of weak instruments in this regression and hence the conclusions should be interpreted with caution. However, consistent results are obtained with a fixed effects regression, using lags of the determinants to control for endogeneity, lending support to this result.

economic impact of trade relative to other regions (column 3, Table 1).<sup>12</sup> These findings suggest that the characteristics of countries' trade may be important for explaining the relationship between trade and economic growth.

<b>Table 1: International Trade and Economic Growth 1/</b>				
	(1)	(2)	(3)	(4)
Initial GDP per capita	-3.816*** (0.759)	-8.825*** (2.961)	-3.713*** (0.718)	-4.187*** (0.907)
Labor force education	0.773 (0.560)	-2.484 (1.837)	0.478 (0.526)	-0.374 (2.133)
Terms of trade	-1.741 (1.833)	2.591 (5.065)	-1.495 (1.688)	-1.604 (1.666)
Public Infrastructure	1.674*** (0.407)	5.094*** (1.813)	1.895*** (0.394)	0.643 (1.019)
Trade openness	2.045*** (0.574)	-0.0408 (1.494)	1.658*** (0.574)	0.426 (1.298)
FDI (percent of GDP)	0.274 (0.238)	0.430 (0.533)	0.362* (0.217)	0.399 (0.266)
Advanced economy (dummy)		-38.05* (22.07)		
Advanced economy (dummy)*Trade Openness		10.97** (5.551)		
Latin America and the Caribbean (dummy)			-2.196*** (0.814)	
Latin America and the Caribbean (dummy)*Trade Openness			6.723** (2.968)	
Labor force education*Trade Openness				0.381 (0.293)
Public Infrastructure*Trade Openness				0.194 (0.578)
Observations	1,041	1,041	1,041	1,041
Number of ISO	135	135	135	135
AR(1)	0.0190	0.0299	0.0190	0.0192
AR(2)	0.244	0.309	0.254	0.241
Hansen	0.511	0.00694	0.901	0.577

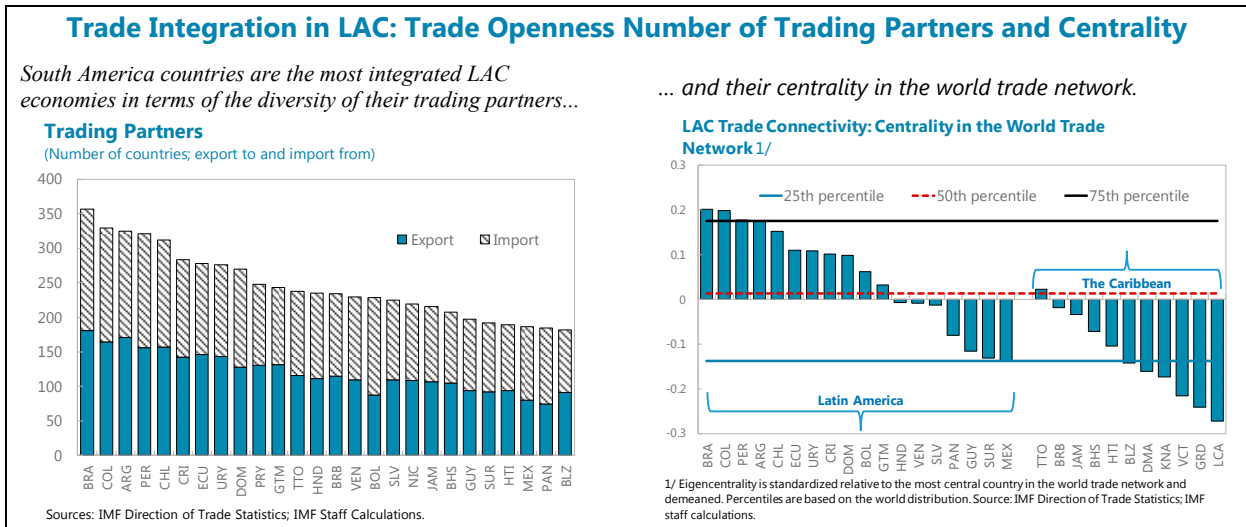
1/ This table reports the results of regressions of growth in real GDP per capita on trade openness using system GMM. All regressions include time fixed effects. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

<sup>12</sup> Conversely, results of a similar (not reported) regression with a dummy variable for Asian economies and an interaction term between the Asian dummy variable and trade openness suggest that impact of trade openness is lower than for other regions. This related, but converse, finding lends support to our hypothesis that the characteristics of countries' trade connections also matter for the impact of trade on economic growth.

The remainder of this section explores whether the characteristics of countries' trade connections can enhance economic growth. The analysis expands the benchmark regression to explore the trade-growth nexus between countries' trade connectivity, including their participation in global value-chains, as well as the composition of their export markets and products.

### *International Trade Connectivity*

**Network indicators are an alternative way to assess the importance of countries' trade integration for economic growth.** Countries with similar levels of integration based on trade openness can have very different patterns of integration based on alternative network connectivity measures that consider more granular aspects of countries' integration. Network measures consider the number or diversity of countries' trading partners, broken down by import and export partners, as well as countries' centrality or importance and that of their main partners in the global trade network.<sup>13</sup> Available bilateral trade data includes only data on trade in goods.<sup>14</sup> Therefore, for countries where services are particularly important, the calculated network indicators may understate their integration into the world trade network. For LAC, network indicators based on bilateral data on trade in goods suggest a higher degree of integration into the world trade network than suggested by trade openness (Beaton, Cebotari, Ding and Komaromi forthcoming). LAC maintains a diversified set of trading partners and the larger LA economies occupy a central role in the world trade network.



<sup>13</sup> In network terminology, the number of a country's total trading partners (export and import) is referred to as its total degree, while the number of a country's export (import) trading partners is referred to as out (in) degree. Centrality is a measure of influence of a node (country) in the network where the centrality or importance of the given node is related both to its own importance in the network as well as that of its connections (trading partners).

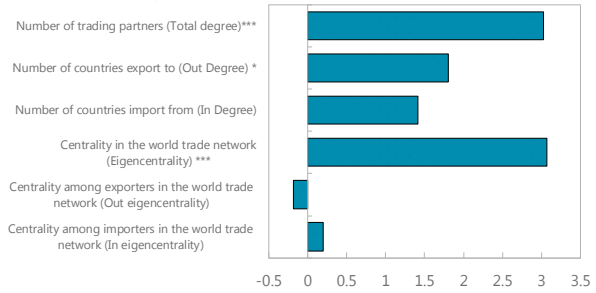
<sup>14</sup> The network indicators are calculated using bilateral trade data from the IMF's Direction of Trade Statistics. The DOTS database provides the value of bilateral exports and imports for goods only.

**More expansive and diverse trading networks can enhance economic activity.**

Table 2 shows the results of the baseline regression augmented with the network connectivity measures.<sup>15</sup> In all regressions, the network measures included are standardized relative to the most connected country in the world trade network according to that indicator and demeaned.<sup>16</sup> The results confirm that it is not only trade openness that matters for economic growth, but also the extent of a country's network of trading partners and its centrality in the world trade network.

**Trade Connectivity and Economic Growth**

(impact on 5-year average real per capita growth rate from moving from the 25 to the 75 percentile of trade statistic; in percentage points)



Note: Based on system GMM estimates of the impact of trade on growth. Each trade variable is included in a distinct growth regression with the exception of in and out degree and in and out eigencentality, which are included simultaneously in two distinct growth regressions. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

**The economic benefit of expanding a country's trade connections is primarily from increasing its export markets.** Countries with a larger number of total trade partners (column 1, Table 2) benefit in terms of improved economic outcomes. Moving from the 25<sup>th</sup> percentile of all countries according to this measure of connectivity to the 75<sup>th</sup> percentile could improve average growth outcomes by about 3 percentage points over a five-year period. This would entail an increase in a country's total number of trading partners by 142 partners – a sizeable increase. Broadening export markets rather than import markets is what matters for economic growth (column 2, Table 2). The number of export markets (out degree) is significant and positive for growth, but the number of import source countries (in degree) is insignificant for growth.<sup>17</sup> Increasing a country's export markets by 85 to bring it from the 25<sup>th</sup> to the 75<sup>th</sup> percentile of the distribution would enhance average growth by 1.8 percentage points over a 5-year period

**The potential for LAC countries to strengthen growth outcomes by expanding their trade networks appears to be limited.** While about 2/3 of LAC countries fall below the average in terms of the number of their total trading partners, the relative poor connectivity of the region by this measure is primarily associated with Caribbean countries. For these countries, their smaller trade networks are primarily a reflection of the relatively small size of their economies, particularly some island economies with small populations, where increasing the number of trade connections may not be feasible.<sup>18</sup> For these economies,

<sup>15</sup> In addition to the network measures included on Table 2, a range of other network indicators was also considered (see Annex 1) with similar results.

<sup>16</sup> The measures are standardized on an annual basis before being averaged over the 5-year periods included in the regression and are subsequently demeaned. The robustness of the results was confirmed with a set of regressions that considered instead ranked network connectivity measures (not reported).

<sup>17</sup> This is supported by results of a Wald test of the difference in coefficients.

<sup>18</sup> The small island economies of the Eastern Caribbean Currency Union, which has a combined population of around 600 thousand for the six independent members, are the least integrated in terms of the number of trading partners.

exports of services, in part given the importance of tourism, also tend to be important and the bilateral data on goods trade may understate these countries' connectivity. Among LA countries; Argentina, Brazil, Colombia, Chile, and Peru expanded the number of their trading partners and are among the most diversified countries globally in terms of both their total number of partners and their export partners. These countries have likely neared capacity in terms of further expanding their number of their trading partners. Mexico and Panama are relatively less connected and may have potential to further diversify their networks. For Mexico, the limited diversification of its trading network is linked to the dominance of the U.S. market for its trade despite the existence of a broad spectrum of trade agreements, whereas for Panama, similar to the Caribbean, this may reflect the importance of trade in services.

**Table 2: International Trade Connectivity and Economic Growth 1/**

	(1)	(2)	(3)	(4)
Initial GDP per capita	-3.754*** (0.626)	-3.491*** (0.579)	-3.637*** (0.603)	-3.469*** (0.588)
Labor force education	-0.211 (0.562)	-0.336 (0.527)	-0.124 (0.552)	0.102 (0.598)
Terms of trade	-11.24*** (3.006)	-11.44*** (3.042)	-11.58*** (3.149)	-8.707*** (3.052)
Public Infrastructure	1.651*** (0.404)	1.577*** (0.371)	1.511*** (0.416)	1.775*** (0.369)
Trade openness	1.255* (0.654)	1.028* (0.608)	1.333** (0.660)	1.336** (0.663)
FDI (percent of GDP)	0.636** (0.261)	0.672*** (0.243)	0.543** (0.269)	0.638*** (0.231)
Number of trading partners (Total degree)	7.695*** (2.294)			
Number of countries import from (In Degree)		3.992 (3.086)		
Number of countries export to (Out Degree)		3.846* (2.232)		
Centrality in the world trade network (Eigencentality)			9.787*** (2.500)	
Centrality among exporters in the world trade network (Out eigencentality)				-5.719 (4.529)
Centrality among importers in the world trade network (In eigencentality)				10.50 (6.676)
Observations	829	829	829	829
Number of ISO	131	131	131	131
AR(1)	0.0595	0.0615	0.0561	0.0645
AR(2)	0.390	0.392	0.395	0.409
Hansen	0.199	0.399	0.171	0.544

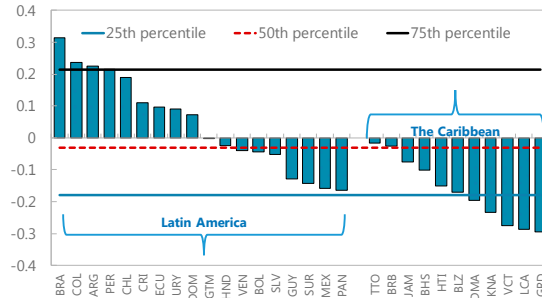
1/ This table reports the results of regressions of growth in real GDP per capita on various indicators of trade connectivity based on network theory using system GMM. All regressions include time fixed effects. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



### LAC Trade Connectivity: Trading Partners

The larger LA economies are well connected in terms of trading partners while the Caribbean is poorly connected...

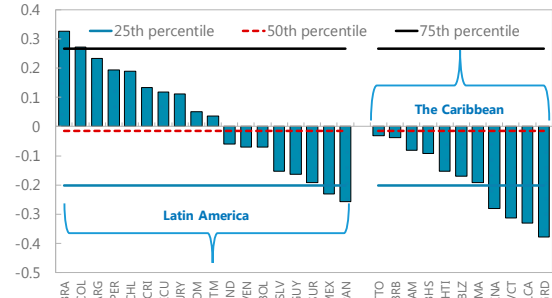
LAC Trade Connectivity: Total Number of Trading Partners (Export and Import: Total Degree)<sup>1/</sup>



<sup>1/</sup> The total number of trading partners is standardized relative to the country with the largest number of trading partners in the world trade network and demeaned. Percentiles are based on the world distribution. Source: IMF Direction of Trade Statistics; IMF staff calculations.

...regardless of whether all trading partners or only export partners are considered.

LAC Trade Connectivity: Total Number of Export Partners (Out Degree)<sup>1/</sup>



<sup>1/</sup> The total number of export partners is standardized relative to the country with the largest number of export partners in the world trade network and demeaned. Percentiles are based on the world distribution. Source: IMF Direction of Trade Statistics; IMF staff calculations.

**Being at the center of the world trade network is associated with positive growth effects** (column 3, Table 4). It is a country's overall centrality, rather than its centrality amongst importers or exporters separately, that matters for growth outcomes.<sup>19</sup> Conceptually, the importance of a country's centrality in the global trade network for economic growth may be linked to enhanced opportunities to gain from technology diffusion and learning spillovers given the preponderance of trade activities that either flow directly to or from a country or to or from a country's direct trading partners. For instance, Arora and Vamvakidis (2005) find that countries benefit directly from an increase in economic growth of their trading partners.

**Latin American countries appear to already be well-placed to reap the growth benefits from their central roles in the world trade network.** As with the network indicators based on the number of their trade connections, Argentina, Brazil, Chile, Colombia, and Peru already occupy relatively central roles in the world trade network. Mexico and Panama again stand out as the relatively less central LA countries, likely associated with the dominance of Mexico's trade with the United States and the importance of services for Panama. Similarly, the Caribbean remains on the periphery of the world trade network, but given the small size of many of these economies, the prospects to occupy a more central role in the global network are likely limited.

### Global Value Chains

**Global production has become increasingly fragmented across countries.** This is reflected in the development of GVCs or networks of the production stages of manufactured goods and services across borders. Participation in GVCs offers an enhanced opportunity for countries, relative to broad trade openness, to benefit from learning and technological spillovers and increase productivity. The intra-industry trade that characterizes participation in GVCs encourages producers to upgrade product quality, including by building on the foreign technologies to which they are exposed through trade (e.g. Baldwin and Yan 2014, de

<sup>19</sup> Kali and Reyes (2007) report similar results using ranked measures of network connectivity; however, their analysis is limited to network indicators for only 1992 and 1998.

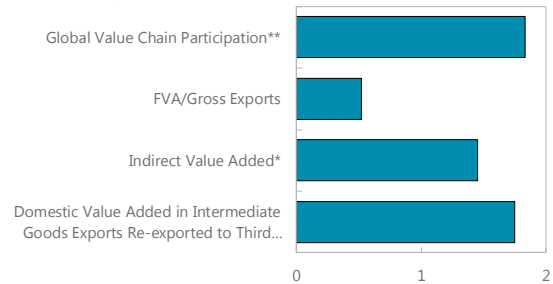
la Torre, Lederman and Pienknagura 2015). For Asian economies in particular, participation in global value chains has been linked to positive growth spillovers.

**Countries' participation in GVCs varies depending on whether they are downstream or upstream in the production process.** A country's total GVC participation is measured as the sum of its foreign value added in gross exports and indirect value added (the value of exported goods that are used as imported inputs by other countries to produce their exports).<sup>20</sup> Countries with higher foreign value-added are considered more downstream in the global production chain (i.e. more backward-oriented in their production) as they import intermediate goods to assemble and export a final product. Conversely, countries with higher indirect value added are considered more upstream in the production process (i.e. more forward-oriented in their production) as they provide intermediate inputs in the value-added produced by other countries (Koopman, Power, Wang and Wei 2010, UN 2015, and IMF 2015).

**Participation in GVCs, particularly upstream participation, can lead to knowledge spillovers and enhance the effect of trade on economic growth (Table 3).**<sup>21</sup>

Increasing a country's participation in GVCs from the 25<sup>th</sup> to the 75<sup>th</sup> percentile could enhance its 5-year average per capita growth by 1.8 percentage points.<sup>22</sup> Differentiating between the two components of participation in GVCs (column 2) reveals that it is countries' upstream participation that has the more important effect on growth. Downstream participation also has a positive, although not statistically significant, effect. The length of the GVC in which a country participates (captured by domestic value-added in intermediate goods production re-exported to third countries as in Koopman et al. (2014)) also appears to matter for economic growth.<sup>23</sup> These

**Participation in Global Value Chains and Economic Growth**  
(impact on 5-year average real per capita growth rate from moving from the 25 to the 75 percentile of trade statistic; in percentage points)



Sources: Eora MRIO. Global value chain participation is included in a distinct growth regression while FVA/gross exports and indirect value added (the sub-components of GVC participation) are considered jointly as are FVA/gross exports and domestic value added in intermediate goods exports re-exported to third countries/gross exports. \*\* $p < 0.01$ , \* $p < 0.05$ ,  $p < 0.1$ .

<sup>20</sup> Specifically, participation in GVCs is measured as the sum of foreign value added in gross exports and indirect domestic value added (the value of exported goods that are used as imported inputs by other countries to produce their exports) calculated using the Eora Multi Region Input Output (MRIO) Table (Lenzen, Kanemoto, Moran and Geschke 2012 and Lenzen, Moran, Kanemoto and Geschke 2013) based on Koopman, Wang, and Wei (2014)'s decomposition of gross exports. Cerra and Woldemichael (forthcoming) also adopt this definition of GVC participation.

<sup>21</sup> The results of the Hansen test of over-identifying restrictions are indicative of weak instruments for all regressions in Table 3 that include different measures of participation in GVCs and hence the results should be interpreted with caution.

<sup>22</sup> These results are also consistent with evidence from Cerra and Woldemichael (forthcoming) that suggest that higher participation in GVCs raises the probability of the occurrence of an acceleration in exports by about a third.

<sup>23</sup> This interpretation was also used in IMF (2015).

results are consistent with the enhanced exposure of firms at the middle stages of the production process to knowledge diffusion across firms inside the GVC therefore raising productivity (Baldwin and Yan 2014).

**LAC's participation in GVCs remains limited compared to other regions.** LAC has largely missed out on the recent wave of fragmentation of production as its participation in GVCs remains low relative to other regions, particularly relative to countries in Asia. There is no clear trading hub comparable to China in Asia or Germany in Europe where these countries form the center of a regional value chain: importing (intermediate goods) from within the region and exporting to large markets (Beaton, Cebotari, Ding and Komaromi, forthcoming, IMF (2015)). The U.S. is a much more pronounced hub for regional trade than are any of the systemic countries in the region. Trade, as a result, is more strongly concentrated outside the region than within.

**There is considerable heterogeneity in LAC's participation in GVCs across countries and by stage of the production process.** While LAC's participation in GVCs remains limited compared to other regions, some countries do participate in GVCs. Mexico and Central America, for example, are engaged in production networks with North American firms in particular and tend to participate at the final or downstream stages. On the other hand, South American countries tend to be involved in the earlier or upstream stages of supply chains, given their strong natural resource endowments (Blyde et al, 2014). LAC countries also tend to participate in relatively shorter GVCs. Nevertheless, by all measures of participation in GVCs, LAC has not maximized its participation and enhanced participation may offer LAC new opportunities for technology transfer, particularly through trade in intermediate goods. Based on the results in Table 3, bringing LAC's participation in GVC's in line with that of Asia has the potential to increase the region's real per capita growth by about 1 percentage point.

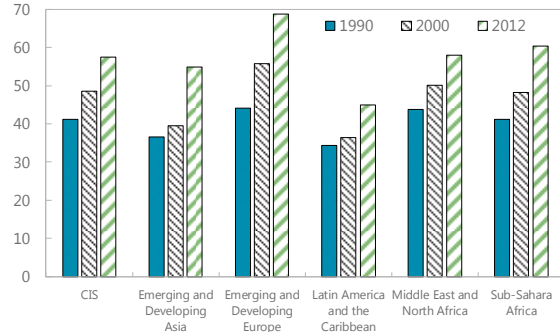
**Enhancing LAC's participation in GVCs will require supportive reforms.** Cheng, Rehmon, Seneviratne and Zhang (2015) show that fostering GVC participation requires efforts to reduce trade barriers, enhance infrastructure, foster human capital formation, support research and development and improve institutions. Removing trade barriers is of particular importance for enhancing participation in GVCs as the detrimental effect of a given trade barrier is compounded in a production environment in which intermediate goods cross borders multiple times. In this environment, trade barriers within a GVC on the import of intermediate goods effectively act as a tax on the economy's exports. For LAC, the region's infrastructure deficiencies are well known (e.g. Cerra et al. 2016) and would likely need to be addressed to strengthen participation in GVCs. Finally, to reap the largest gains from their participation in GVCs, LA countries should continue to focus on human capital development and putting in place an environment conducive to R&D, which have been shown to facilitate a shift upstream in GVC participation and enable countries to capture a higher share of value-added along a GVC (Cheng, Rehmon, Seneviratne and Zhang (2015)).

### LAC: Participation in Global Value Chains

LAC's participation is limited relative to other emerging regions.

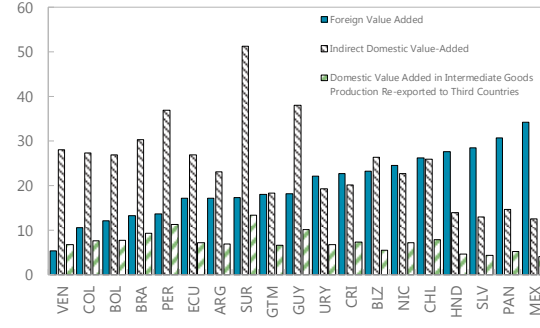
...with significant heterogeneity in the degree and stage of participation within LAC.

#### Participation in Global Value Chains (in percent of gross exports)



Sources: Eora MRIO; IMF Staff Calculations.

#### Latin America: Participation in Global Value Chains (in percent of gross exports)



Sources: Eora MRIO; IMF Staff Calculations.

**Table 3: Participation in Global Value Chains and Economic Growth 1/**

	(1)	(2)	(3)
Initial GDP per capita	-4.747*** (0.662)	-4.494*** (0.637)	-4.610*** (0.665)
Labor force education	-1.495 (0.933)	-1.447* (0.855)	-1.620* (0.883)
Terms of trade	-8.084 (5.008)	-6.041 (4.696)	-7.280 (4.985)
Public Infrastructure	2.508*** (0.576)	2.456*** (0.549)	2.484*** (0.577)
Trade openness	2.920*** (0.953)	3.144*** (0.944)	3.350*** (0.915)
FDI (percent of GDP)	0.463 (0.496)	0.606 (0.477)	0.675 (0.505)
Global Value Chain Participation 2/	0.0909** (0.0412)		
FVA/Gross Exports		0.0304 (0.0530)	0.0657 (0.0543)
Indirect Value Added 3/		0.0889* (0.0490)	
Domestic Value Added in Intermediate Goods Exports Re-exported to Third Countries/Gross Exports			0.485*** (0.175)
Observations	652	652	652
Number of ISO	135	135	135
AR(1)	0.0197	0.0169	0.0178
AR(2)	0.582	0.611	0.609
Hansen	0.0666	0.0502	0.0302

1/ This table reports the results of regressions of growth in real GDP per capita on countries' participation in Global Value Chains (GVCs) using system GMM. All regressions include time fixed effects. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

2/ The sum of foreign value added as a share of gross exports and indirect value added as a share of gross exports.

3/ Indirect value added is the value of exported goods that are used as imported inputs by other countries to produce their exports.

## Export Markets

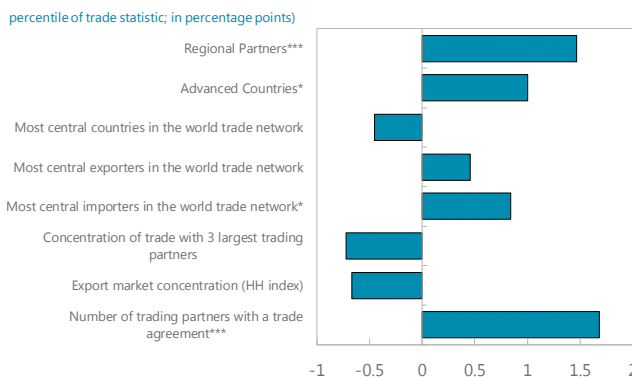
**The composition of countries' export markets is an important aspect of the relationship between international trade and economic growth.** The extent to which international trade results in learning and technological spillovers may depend on the level of development of a country's trading partners, in addition to its role in the global value chain, for example. This section augments the baseline regression in Table 1 with variables reflecting the composition of an economy's trading partners.<sup>24</sup> The result in Table 4 confirm that the economic benefit of trade can differ depending on the nature of a country's trading partners.

### Trade connections with regional partners are associated with larger growth effects than inter-regional trade connections (column 1, Table 4).<sup>25</sup>

Relative to other regions, particularly Europe and Asia, LACs exports are much less regionally integrated, given the importance of the U.S. and Chinese markets for many Latin American exporters, as well as the concentration of many countries' exports in primary commodities. With only about a quarter of total exports destined to markets within the region, LAC lags behind other Asia and Europe where intra-regional destinations account for over two thirds of exports. Most LAC countries have regional export shares well below the 50<sup>th</sup> percentile of the world distribution, suggesting considerable scope for countries to boost growth by strengthening their intra-regional trading relationships. Results in Table 4 suggest that increasing intra-regional trade in LAC from about 15 percent of the region's exports to 55 percent, a level comparable to Asia, could enhance regional per capita growth by 1.3 percentage points. However, to some extent, LACs relatively lower degree of regional integration is consistent with its natural resource endowments and consequent structure of

### Export Markets and Economic Growth

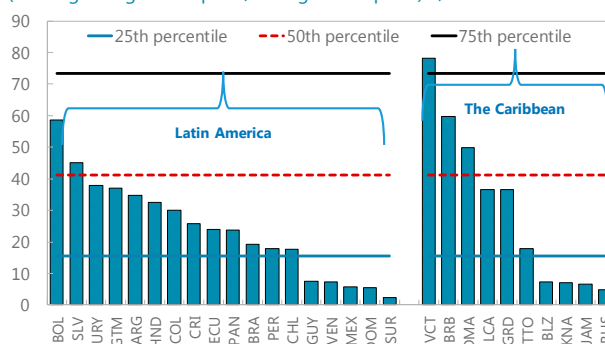
(impact on 5-year average real per capita growth rate from moving from the 25 to the 75 percentile of trade statistic; in percentage points)



Sources: All variables are included in separate growth regressions.\*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

### LAC Exports Markets: Importance of Regional Trade

(Intraregional goods exports/Total goods exports) 1/



1/ Percentiles are based on the world distribution. Source: IMF Direction of Trade Statistics; IMF staff calculations.

<sup>24</sup> Trade shares are based on DOTS data and thus include only goods trade.

<sup>25</sup> To assess whether the importance of regional trade merely reflects the regional nature of many global value chains a dummy variable for Asian economies, the most important global value chain, was included in the regression and interacted with the share of exports to regional partners. The interaction term was insignificant, supporting evidence of a unique effect of regional trade on growth.

production, which is concentrated in the commodities sector, which may limit LACs ability to increase intra-regional trade (see also IMF 2015).

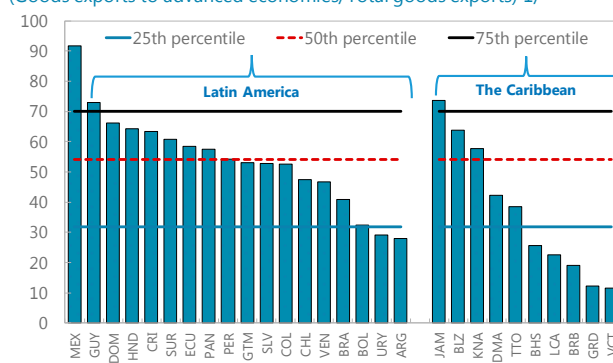
**Regional integration in LAC has been characterized by an extensive network of RTAs and FTAs.** The largest regional agreements include MERCOSUR and NAFTA, both ratified in the 1990s, and CAFTA-DR and the Pacific Alliance more recently. However, few countries in LAC have used FTAs to effectively expand market access within and outside the region (IDB, 2016). The complicated network of trade agreements within LAC may also inhibit the development of regional value chains. At the same time, the existing agreements provide the basis from which the region could deepen integration by better linking existing agreements with enhanced focus on economic policy coordination given that 92 percent of inter-regional trade is already fully liberalized (Mowatt, forthcoming).

**Trading with advanced economies is associated with stronger growth outcomes than trading with emerging market and developing countries** (column 2, Table 4).<sup>26</sup> Historically,

Latin American and Caribbean countries have benefited from their strong trade ties to advanced economies with a significant share of many countries' exports destined to the United States. However, more recently, the emergence of China as a key export destination for the region's exporters, particularly the region's commodity exporters like Brazil, Chile, Peru, Uruguay and Venezuela, has contributed to a rise in the share of many countries' trade with emerging markets and developing countries. The share of emerging markets and developing countries in LAC countries' total exports increased about 50 percent, from 33 percent on average over 1995-1999 to about 50 percent on average over 2010-2015, since the early 2000s, consistent with China's entry into the WTO and the emergence of emerging Asia as a key export destination for LAC countries. The emergence of new export markets for LAC and diversification of its export partners may have thus lowered the overall impact of trade on economic growth for LAC given that the expansion has been driven to a large extent by trade with other emerging market and developing countries. However, looking ahead, strengthened ties with emerging markets and regional integration may be the most promising avenues to expand trade given rising protectionist sentiment in advanced economies.

**The centrality of a countries' trading partners in the world trade network may also affect the economic benefit of a countries' trading relationships.** Column 3 of Table 4 reports the estimations associated with the share of trade with the top 3 countries in the world

**LAC Exports Markets: Importance of Trade with Advanced Economies**  
(Goods exports to advanced economies/Total goods exports) 1/



1/ Percentiles are based on the world distribution. Source: IMF Direction of Trade Statistics:

<sup>26</sup> This is consistent with evidence from De la Torre, Didier, Ize, Lederman, and Schmukler (2015) that trading with North countries, which are dominated by advanced economies, is associated with larger effects on growth than trading with South countries, which are dominated by emerging market and developing economies.

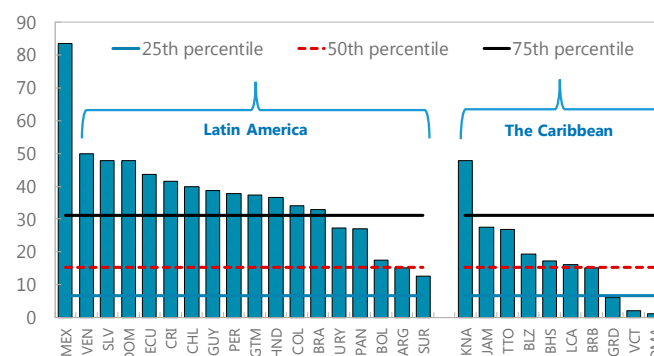
trade network as ranked by their centrality in the world trade network.<sup>27</sup> While the results suggest that the strength of a countries' overall trade with the most central countries in the world trade network does not matter for growth, when this is decomposed into countries' trade with the most central exporters and importers in the world trade network (column 4 of Table 4), those countries with exports destined toward the most central importers have better growth outcomes.<sup>28</sup> The results suggest increasing the share of trade with the most central importers from the 25<sup>th</sup> percentile of countries to the 75<sup>th</sup> percentile would increase average per capita growth by 0.8 percentage points. While trade connections with the most central importers in the world trade network can offer additional growth benefits, the concentration of a countries' export markets more generally (either measured by the concentration of a country's trade with its three largest trading partners or its export market diversification see columns 5 and 6 of Table 4) does not confer any additional growth benefits, suggesting that there is some aspect of the connection with the largest importers that confers unique benefits for economic growth.

### Formalizing trade relationships with trade agreements can enhance economic growth.

Countries with a higher number of trade agreements (see column 7, Table 4) have more positive growth outcomes. Increasing the number of trade agreements from the 25<sup>th</sup> percentile to the 75<sup>th</sup> percentile is associated with a 1.5 percentage point increase in average per capita growth.<sup>29</sup> This finding is consistent with recent evidence from Hannan (2016) that trade agreements can yield substantial gains for export

performance, on average an increase of exports by 80 percentage points over ten years. These benefits are found to be especially important for emerging markets, such as the countries of LAC, and for trade agreements between emerging markets and advanced economies.<sup>30</sup> The

**LAC Exports Markets: Importance of Trade with Most Central Importers** (Goods exports to top 3 central importers/Total goods exports) 1/



1/ Percentiles are based on the world distribution. Source: IMF Direction of Trade Statistics; IMF staff calculations.

<sup>27</sup> As measured by total eigencentrality. The calculation is done separately for each year of the sample period.

<sup>28</sup> This result is comparable to De la Torre, Didier, Ize, Lederman, and Schmukler (2015) who conclude that trade with the most central countries can have positive growth effects. Their study considers centrality based on the random walk betweenness centrality measure developed by Newman (2005) and Fisher and Vega-Redondo (2006) rather than on eigencentrality as examined here.

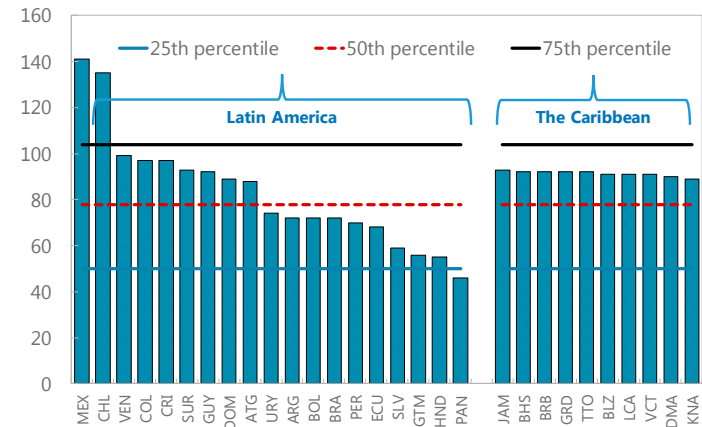
<sup>29</sup> The dataset on trade agreements is from the National Science Foundation-Kellogg Institute database on economic integration agreements compiled by Bergstrand. The impact is calculated on the distribution of the number of trade agreements in 2005, the latest data point available.

<sup>30</sup> While the earlier literature based primarily on evidence from a gravity model of exports tended to find a low impact of trade agreements on export flows (e.g. Frankel, Stein and Wei (1995) and Frankel (1997)), more recent studies that control for the endogeneity of trade policy (e.g. Baier and Bergstrand (2007)) find a greater

positive impact of trade agreements on economic activity, separately from the positive impact of trade openness, is consistent with the trend towards more comprehensive trade agreements that cover broader investment and other bi-lateral policies in addition to traditional barriers to trade in goods and services. Indeed, while the empirical evidence presented here focuses on the number of trade agreements, given cross-country data on the coverage of trade agreements is not available, it is likely that the specific aspects of trade agreements, as well as the accompanying reforms, ultimately determine the overall economic benefits of a given agreement.

**LAC countries have long recognized the importance of strengthening relationships with their trading partners with formal trade agreements.** The Pacific Alliance countries (Mexico, Peru, Colombia, and Peru) in particular have pursued deep trade agreements with the world's largest economies. Of note, is the participation of Chile, Mexico and Peru in the Trans-Pacific Partnership.<sup>31</sup> Most countries in the region are above the 50<sup>th</sup> percentile in the global distribution of the number of trade agreements, with Colombia and Mexico among the most integrated countries globally by this measure. The results in Table 4 confirm that LACs strategy of integrating through trade agreements can have beneficial growth effects, particularly if the region is able to build on existing agreements to further enhance regional integration.

**LAC Exports Markets: Bilateral Trade Agreements 1/**



1/ Percentiles are based on the world distribution. Source: National Science Foundation-Kellogg Institute

impact. IMF (2015) presents inconclusive results of the impact of trade agreements on bilateral export performance. Hannan (2016) adopts a novel synthetic control method to understand the impact of trade agreements for 104 country pairs.



**Table 4: Export Markets and Economic Growth 1/**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial GDP per capita	-3.912*** (0.929)	-4.587*** (1.028)	-2.965*** (0.539)	-3.584*** (0.562)	-4.038*** (0.933)	-4.161*** (0.866)	-4.521*** (1.108)
Labor force education	0.107 (0.669)	0.635 (0.697)	0.229 (0.543)	-0.155 (0.615)	0.597 (0.698)	1.263 (0.996)	1.068 (0.666)
Terms of trade	-2.643 (2.552)	-1.530 (1.907)	-0.552 (5.448)	-2.027 (5.706)	-2.412 (2.139)	-13.71*** (3.662)	-1.838 (2.171)
Public Infrastructure	1.531*** (0.488)	2.109** (0.845)	1.374*** (0.403)	1.777*** (0.473)	1.992*** (0.529)	1.487*** (0.513)	2.208*** (0.773)
Trade openness	2.831*** (0.774)	1.645** (0.818)	1.230* (0.658)	1.714** (0.820)	1.984*** (0.747)	1.724* (0.924)	0.926 (0.642)
FDI (percent of GDP)	0.125 (0.281)	0.201 (0.233)	0.287 (0.217)	0.404** (0.200)	0.245 (0.274)	0.816* (0.434)	0.228 (0.217)
Regional partners	1.019*** (0.369)						
Advanced countries		1.270* (0.707)					
Most central countries in the world trade network			-0.251 (0.350)				
Most central exporters in the world trade network				0.311 (0.315)			
Most central importers in the world trade network				0.549* (0.293)			
Concentration of trade with 3 largest trading partners					-1.492 (1.379)		
Export market diversification (HH index)						-0.912 (0.871)	
Number of trading partners with a trade agreement							2.296*** (0.544)
Observations	988	992	826	826	992	416	897
Number of ISO	130	131	131	131	131	107	135
AR(1)	0.0204	0.0255	0.0633	0.0604	0.0205	0.000206	0.0210
AR(2)	0.298	0.262	0.460	0.367	0.247	0.487	0.226
Hansen	0.175	0.197	0.676	0.201	0.164	0.0291	0.694

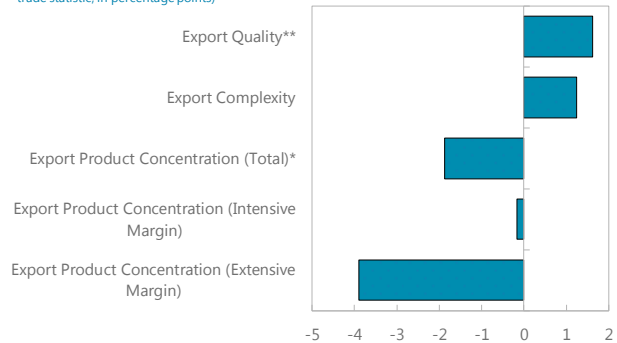
1/ This table reports the results of regressions of growth in real GDP per capita on various indicators of countries' export markets using system GMM. All regressions include time fixed effects. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

### Export Product Characteristics

**A strong focus on export quality can enhance the growth effect of trade.** The results in Table 5 (column 1) suggest that higher export quality is linked to stronger growth effects of exports.<sup>32</sup> LAC's export products are considered high quality across most of the region. By this measure, Mexico, Central America and the Caribbean tend to fair better than the larger LA economies, which remain below the 50<sup>th</sup>

### Export Product Characteristics and Economic Growth

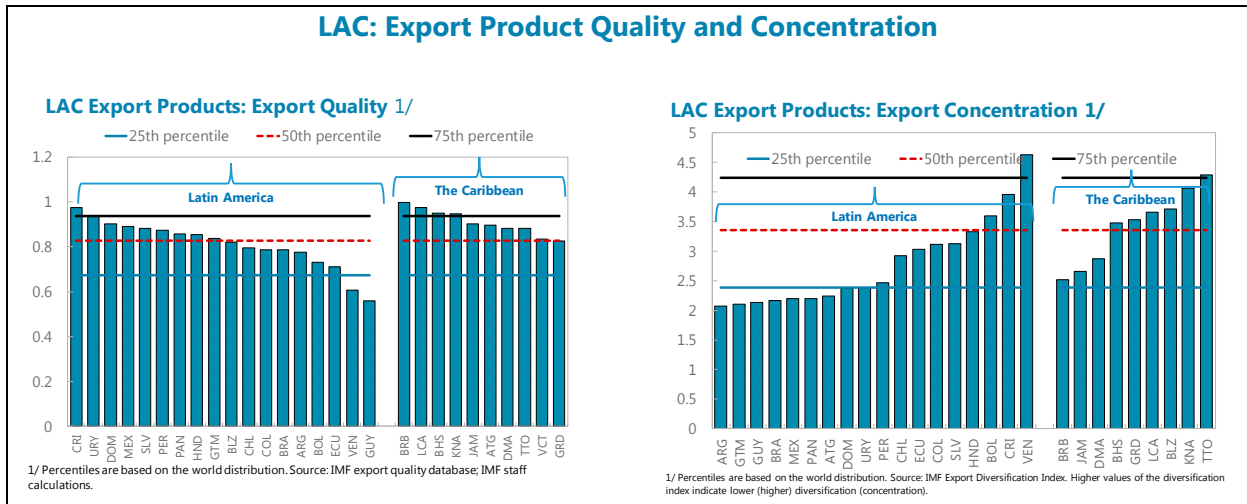
(impact on 5-year average real per capita growth rate from moving from the 25 to the 75 percentile of trade statistic; in percentage points)



Sources: Beaton, Cebotari and Komaromi (forthcoming); Observatory of Economic Complexity, IMF Export Diversification and Quality Databases. All variables are included in separate growth regressions. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

<sup>32</sup> Export diversification is measured using the IMF Export Diversification Index. Higher values of the diversification index indicate lower (higher) diversification (concentration). Export quality is measured by the IMF Export Quality Index. Higher values of the quality index indicate higher export quality.

percentile of the world distribution. In this regard, a stronger focus on export quality could help to strengthen the region's gains from trade.



**LAC could also benefit from diversifying its export product base.** LAC has consistently displayed revealed comparative advantage in exports of mineral fuels and non-fuel primary commodities and has lagged other regions on exports of skill- and technology-intensive manufactured products, a trend compounded by the recent commodity price boom (Ding and Hadzi-Vaskov, forthcoming).<sup>33</sup> This has contributed to relatively elevated export concentration for some of the region's commodity exporters, particularly Trinidad and Tobago and Venezuela. The Caribbean also tends to display relatively high concentration of its export product portfolios, this is linked both to the small size of these economies and to the omission of services from the export concentration index. Therefore, there appears to be scope for LAC as a region to diversify its export product base. Based on the results in Table 5, increasing the diversification of LAC's export product basket by 25 percent has the potential to increase the region's real per capita growth by about 1 percentage point. However, the potential for the region to diversify its product basket may, to some extent, be limited by LAC's comparative advantage in commodity exports given its natural resource endowment.

### **Economic complexity has a positive, but not significant effect on economic growth.**

Economic complexity is based on the idea that the export products of a given country reveal important information about the knowledge level in an economy. Countries that produce a more diverse set of products are considered more knowledgeable or complex as are countries that produce products where production is concentrated in only a few countries. Hausmann et al (2014) find that economic complexity is a significant driver of growth. In contrast, while we find that economic complexity has a positive effect on economic growth, the effect is not significant.

<sup>33</sup> Revealed comparative advantage is measured by comparing the share of a certain good in a country's total exports with the share of that product's world exports in total world exports of all goods. If the country's share is larger than the world share, the country has revealed comparative advantage in that good.

**Table 5: Export Product Characteristics and Economic Growth 1/**

	(1)	(2)	(3)	(4)
Initial GDP per capita	-3.822*** (0.627)	-2.759*** (0.467)	-4.047*** (1.018)	-3.740*** (1.007)
Labor force education	0.540 (0.607)	0.452 (0.634)	0.432 (0.729)	0.221 (0.732)
Terms of trade	-1.937 (1.194)	1.063 (1.327)	-2.390 (2.422)	-2.176 (2.441)
Public Infrastructure	1.417*** (0.550)	1.335*** (0.425)	1.467** (0.713)	1.552** (0.722)
Trade openness	1.860** (0.737)	0.0791 (0.685)	1.705** (0.707)	1.223 (0.755)
FDI (percent of GDP)	0.229 (0.174)	0.507*** (0.169)	0.294 (0.225)	0.327 (0.217)
Export Quality 2/	4.921** (2.481)			
Economic Complexity index 3/		0.781 (0.481)		
Export Product Concentration 4/				
Total Theil Index			-3.239* (1.673)	
Theil Intensive Index				-0.295 (0.231)
Theil Extensive Index				-2.111 (1.562)
Observations	989	784	995	969
Number of ISO	133	110	129	129
AR(1)	0.0271	0.062	0.0219	0.0245
AR(2)	0.386	0.353	0.238	0.240
Hansen	0.233	0.648	0.219	0.546

1/ This table reports the results of regressions of growth in real GDP per capita on various indicators of the characteristics of countries' export products. All regressions include time fixed effects. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

2/ As measured by the IMF Export Quality Index. Higher values indicate higher export quality. Source: IMF Export Quality Database.

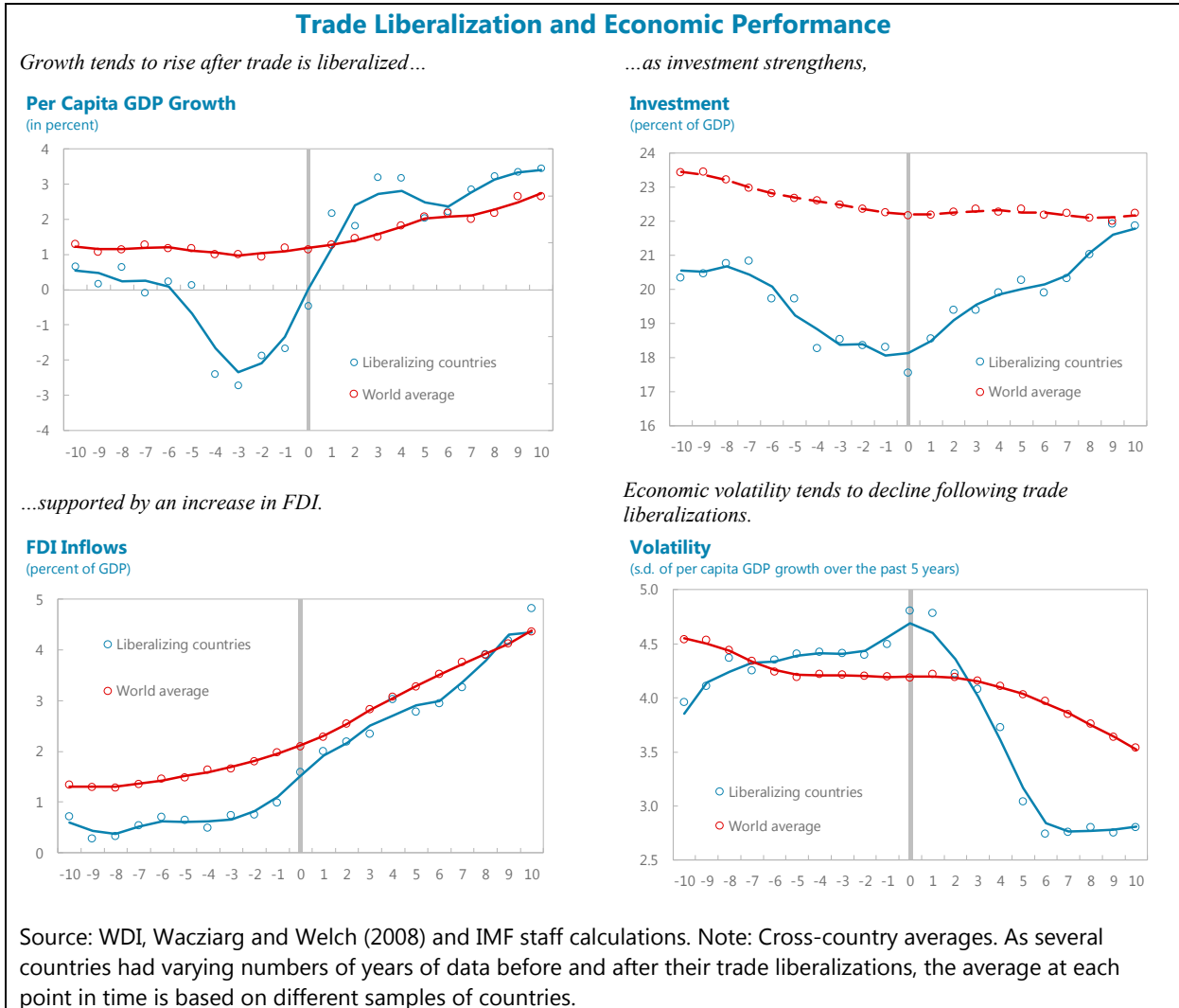
3/ As measured by the Observatory of Economic Complexity. Higher values of the economic complexity index indicate higher complexity of the products produced by a given country.

4/ As measured by the IMF Export Diversification Index. Higher values of the diversification index indicate lower (higher) diversification (concentration). Source: IMF Export Diversification Database.

## Event Studies: Growth, Volatility and Structural Change

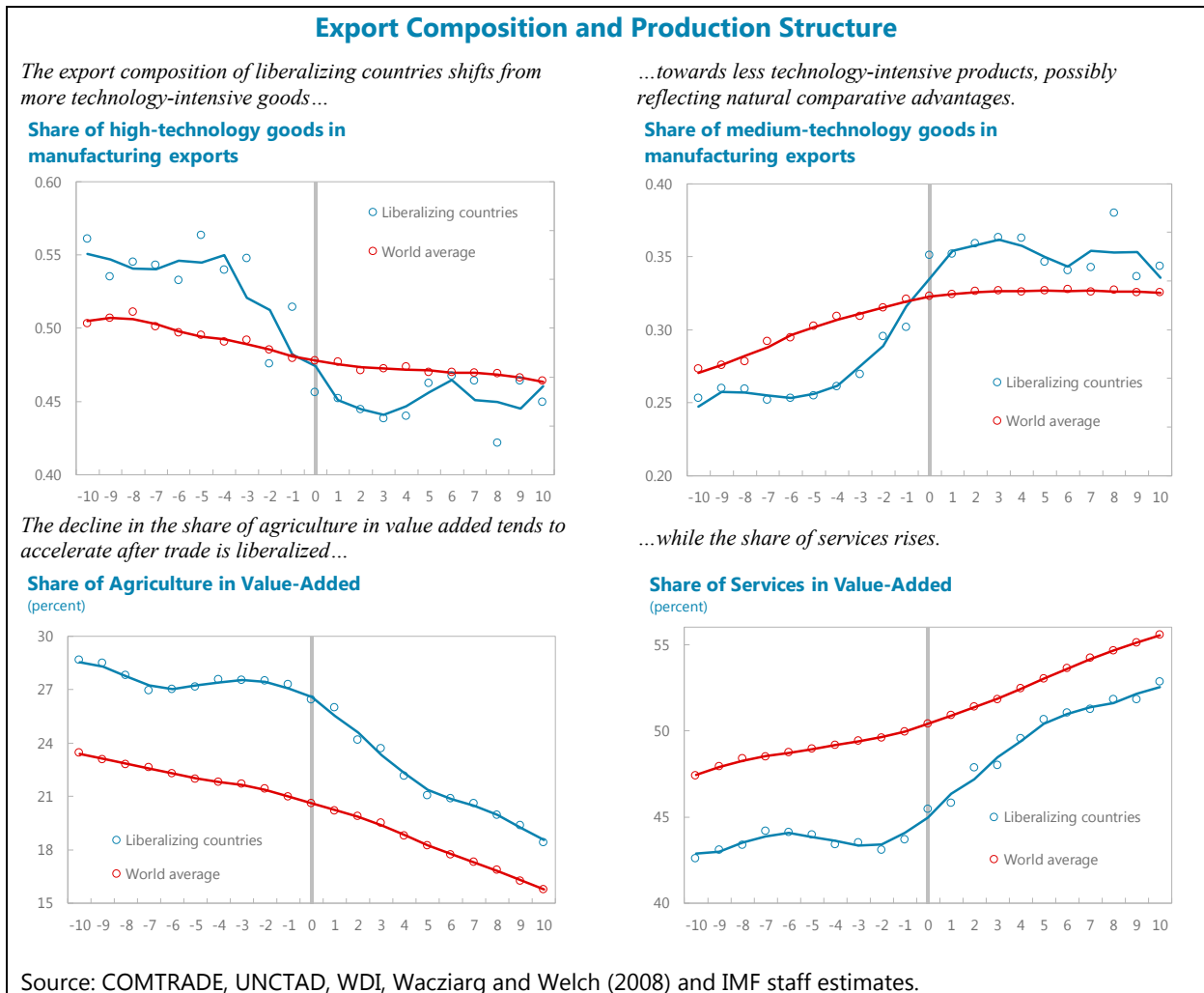
**The complementary event studies reveal similar conclusions: growth and investment tend to pick up after liberalization, supported by foreign capital inflows.** The few years immediately preceding liberalization tend to be low-growth and high-volatility years: reforms are often preceded by downturns or crises. However, growth and investment appear to increase immediately after liberalization and the effects do not die out after a few years. Major trade

reform episodes are also associated with rising foreign direct investment, which could be partly related to accompanying policy changes that liberalize financial flows. A significant acceleration in FDI inflows may have contributed to growth through increases in the capital stock and technology transfer. Against the backdrop of higher growth and investment, the average liberalizing country also experienced a drop in economic volatility.



**Trade opening may induce structural change in the economy, which can potentially lead to winners and losers even if an economy benefits from enhanced trade at the aggregate level.** Trade theory predicts that reductions in trade barriers should lead to sectoral reallocations as the economic structure adjusts to its natural comparative advantages and the country gains access to new technologies. Indeed, trade opening appears to have been associated with such changes both in the export composition and production structure of liberalizing economies. On the one hand, the composition of manufacturing exports shifted towards goods of medium skill-intensity with a declining share of high-skill goods. This pattern is consistent with the interpretation that trade liberalization allowed less developed countries to specialize in their natural comparative advantage after periods of protectionist

trade policies favoring import substitution. On the other hand, sectoral production data suggests that trade opening accelerated the decline in the importance of agriculture and increased the share of the tertiary sector, bringing the economic structure of these countries closer to the world average. Although aggregate data is not easily amenable to detect the distributional effects of trade policy, it is probable that such structural changes *could* lead to significant adjustment costs in certain segments of society, such as rural areas and some manufacturing industries.<sup>34</sup>



**Panel regression results are broadly consistent with the conclusions drawn from the graphical analysis (Table 6).** The coefficient estimates for growth and investment are positive and highly significant. Furthermore, the size of estimated effects is similar to that shown in the figures. The point estimate for volatility is negative, however, it is not statistically significant. The regressions also confirm the shift in the export and production structure of the economy after liberalization: the size of the coefficients is in line with the

<sup>34</sup> For example, the negative impact of tariff reductions on import-competing agro-producers has been shown by Baldarrago and Salinas (forthcoming).

graphical evidence and with the exception of the agriculture value added share the results are significant.

**Table 6: Economic Performance and Liberalization Status, 1970–2015 1/**

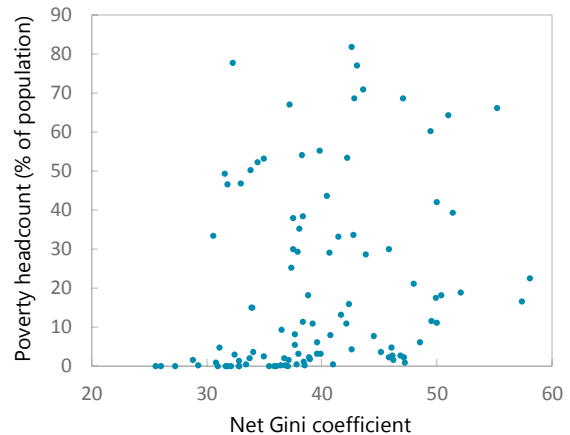
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Dependent variable</i>	<u>Economic performance</u>				<u>Economic structure</u>			
	Per capita growth	Investment rate	FDI inflow	Volatility	Agriculture share	Services share	High-skill man. share	Medium-skill man. share
Liberalization	2.663*** (0.476)	2.307** (0.82)	-0.311 (0.671)	-0.503 (0.362)	-1.956 (1.249)	3.432* (1.436)	-0.122*** (0.022)	0.082*** (0.019)
Number of observations	5611	5178	5113	5424	4702	4689	5516	5516
Number of countries	138	137	138	138	134	134	140	140
Adjusted R <sup>2</sup> (within)	0.087	0.039	0.047	0.051	0.316	0.286	0.047	0.107

1/ This table reports the results of fixed effects panel regressions of several outcome variables on a binary liberalization indicator based on Wacziarg and Welch (2008). All regressions include a time fixed effect. The sample was not restricted to countries that underwent reforms in the sample period. Robust standard errors in parentheses. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.

## B. Trade and Inequality

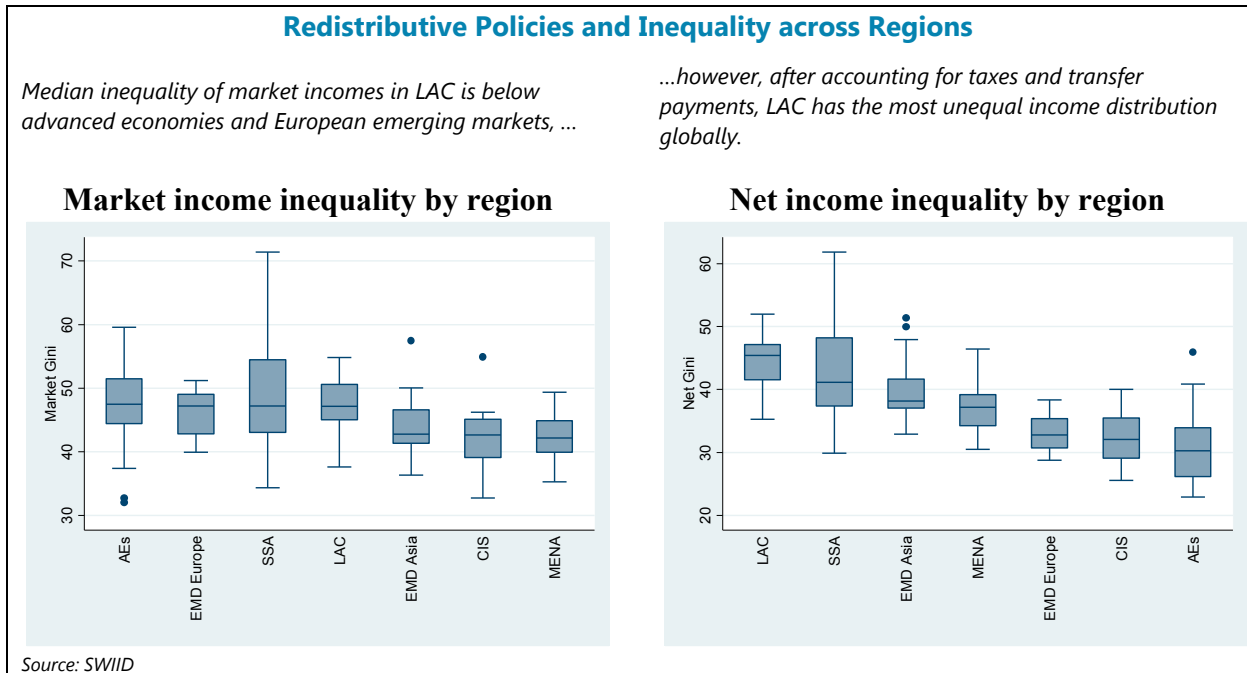
**There has been substantial time variation in inequality over the past three decades, despite generally declining poverty levels.** On average, income inequality has been trending upward in advanced economies from the early 1990s, while emerging and developing countries experienced a substantial deterioration of inequality measures in the 1990s with some offsetting improvements in the more recent period. The sharp increase of inequality in emerging regions corresponds to a period of trade liberalization by many of these countries. At the same time, advanced economies have also faced increased import competition from new entrants, most notably China and other Asian economies. The concurrent acceleration of trade integration and rise of inequality happened in the context of generally falling poverty levels, which highlights that inequality and poverty are different concepts. Poverty indicators compare individual incomes to absolute levels (poverty lines), while inequality measures capture the spread of the income distribution. Hence, it is possible to observe falling poverty and increasing inequality at the same time. In fact, in the cross-section of emerging and developing economies, poverty and inequality measures are only weakly correlated.

**Poverty and Inequality across EMDEs**  
(latest available data point after 2005)



**Redistributive policies have a substantial impact on cross-sectional variation in income inequality.** LAC and Sub-Saharan Africa are the most unequal regions. However, the comparison of market (pre-tax/transfer) and net (post-tax/transfer) income inequality reveals

the major role that government redistribution plays in determining the final income distribution. Advanced economies and European developing countries extensively use redistributive policies to lower income disparities produced by their market economies. In contrast, governments in LAC appear to be ineffective in using their tax systems and safety nets to dampen the high income inequality in the region. This also highlights the need for LAC countries to overhaul their highly regressive tax systems, improve the efficiency of tax administration, and make social programs more targeted (Arnson, Bergman, and Fairfield, 2012).



## Inequality Regressions

**Despite predictions of theoretical models of international trade, trade openness does not appear to influence aggregate income inequality.** Panel fixed effects regressions of the impact of trade openness on the Gini coefficient suggest that trade openness lowers income inequality, but not in a statistically significant way (Table 7). The negative effect of trade openness on inequality is consistent across different measures of the Gini coefficient: market and net. In contrast, financial deepening is associated with rising inequality, while financial openness also has a positive, but not significant effect on inequality. These results are consistent with those of Dabla-Norris et al (2015) and Jaumotte, Lall and Papageorgiou (2013). Dabla-Norris et al (2015) attribute the positive coefficient on financial deepening to emerging market economies and suggest that this may be related to financial inclusion not keeping pace with financial deepening.

**There is some evidence that the effect of trade openness on inequality may vary with the level of development.** The results (Table 7, column 3) suggest that trade openness may

decrease inequality for emerging market economies and increase (although not in a statistically significant way) for advanced economies. The significance of the negative effect of trade openness on inequality for emerging markets holds only when market inequality is considered, suggesting a role for redistributive policy. There is no evidence of a distinct distributional effects for LAC countries compared to other regions.

**Table 7: Trade Openness and Inequality**

	(1)	(2)	(3)	(4)	(5)	(6)
	Market Gini	Net Gini	Market Gini	Net Gini	Market Gini	Net Gini
Trade Openness	-0.0205 (0.0177)	-0.00851 (0.0141)	-0.0413* (0.0244)	-0.0216 (0.0207)	-0.0220 (0.0224)	-0.00796 (0.0177)
Trade Openness*Advanced Economy			0.0563 (0.0410)	0.0355 (0.0293)		
Trade Openness*Latin America and Caribb					0.00649 (0.0301)	-0.00240 (0.0257)
Financial Openness	0.000985 (0.000677)	0.000638 (0.000417)	0.000456 (0.000765)	0.000305 (0.000392)	0.00101 (0.000749)	0.000629 (0.000479)
Financial Deepening	0.0342*** (0.0119)	0.0215** (0.00840)	0.0349*** (0.0125)	0.0219** (0.00866)	0.0343*** (0.0120)	0.0215** (0.00848)
Education	-0.0884 (0.450)	-0.254 (0.350)	-0.0905 (0.442)	-0.255 (0.346)	-0.0759 (0.465)	-0.259 (0.355)
Government Spending	0.183 (0.262)	0.267 (0.198)	0.186 (0.266)	0.270 (0.199)	0.181 (0.261)	0.268 (0.197)
Agriculture Employment Share	-0.199 (0.133)	-0.191 (0.122)	-0.214 (0.136)	-0.200 (0.124)	-0.201 (0.136)	-0.190 (0.123)
Industry Employment Share	-0.0500 (0.0830)	0.00941 (0.0627)	-0.0301 (0.0870)	0.0219 (0.0668)	-0.0515 (0.0797)	0.00995 (0.0601)
Constant	48.74*** (5.037)	39.67*** (4.091)	48.12*** (5.069)	39.28*** (4.118)	48.80*** (5.006)	39.65*** (4.084)
Observations	562	562	562	562	562	562
R-squared	0.133	0.120	0.143	0.126	0.133	0.120
Number of ISO	118	118	118	118	118	118

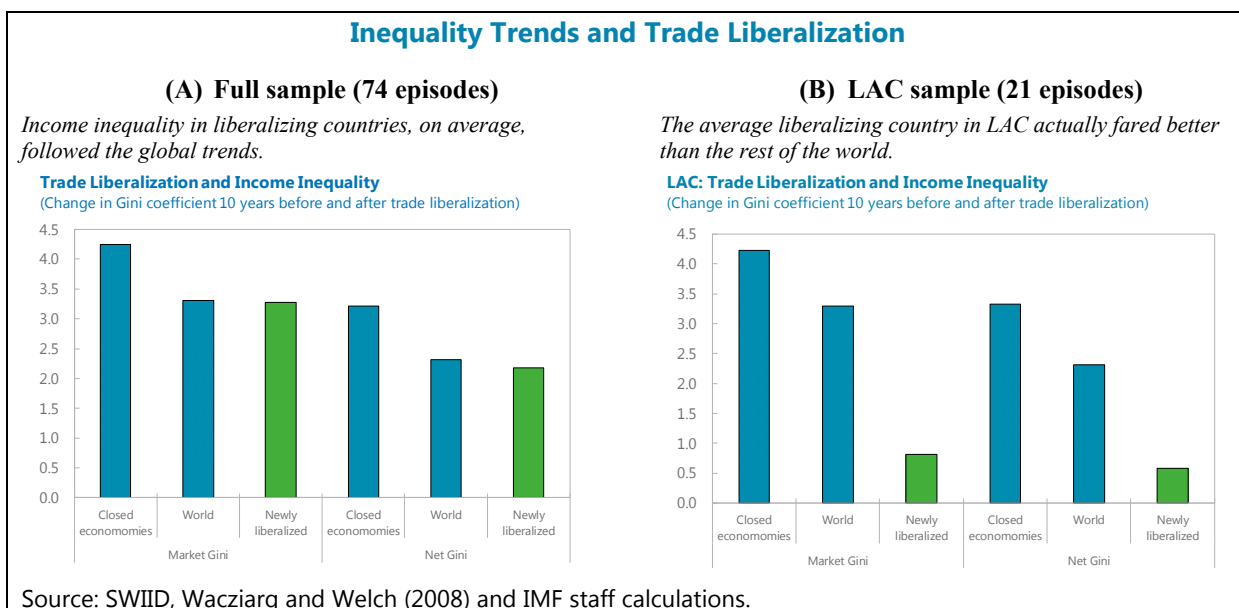
Sources: Barro-Lee; MF World Economic Outlook; Fraser Institute; World Bank.  
Note: Panel fixed effects regressions using five-year panels over 1980-2013 estimated with time and country fixed effects and robust standard errors clustered at the country level. Financial openness is measured as the sum of foreign assets and liabilities relative to GDP; financial deepening is captured by the ratio of private credit to GDP; education is the average years of schooling from Barro-Lee; government spending (included to capture redistributive policies) is the Fraser Institute Index that measures total government spending as a share of GDP.

### Event Studies: Inequality Trends around Trade Liberalization

**Event studies confirm that countries in the process of liberalizing their trade do not observe worse dynamics in income inequality than the rest of the world.** Although average inequality increased worldwide in the event windows, the newly liberalizing countries did not



experience a larger increase than the world average.<sup>35</sup> Moreover, they experienced a smaller increase in their Gini coefficient than the closed economies. These results are even starker if we consider only the Latin American experience: the rise in inequality after LAC trade reforms is much smaller than in the control group. The lack of a more negative trend around major liberalization episodes suggests that trade opening was not the primary driver of rising aggregate inequality in these countries. Simple panel regressions corroborate these findings: the coefficient on the liberalization indicator is insignificant for both the market and the net Gini coefficient (Table 8).



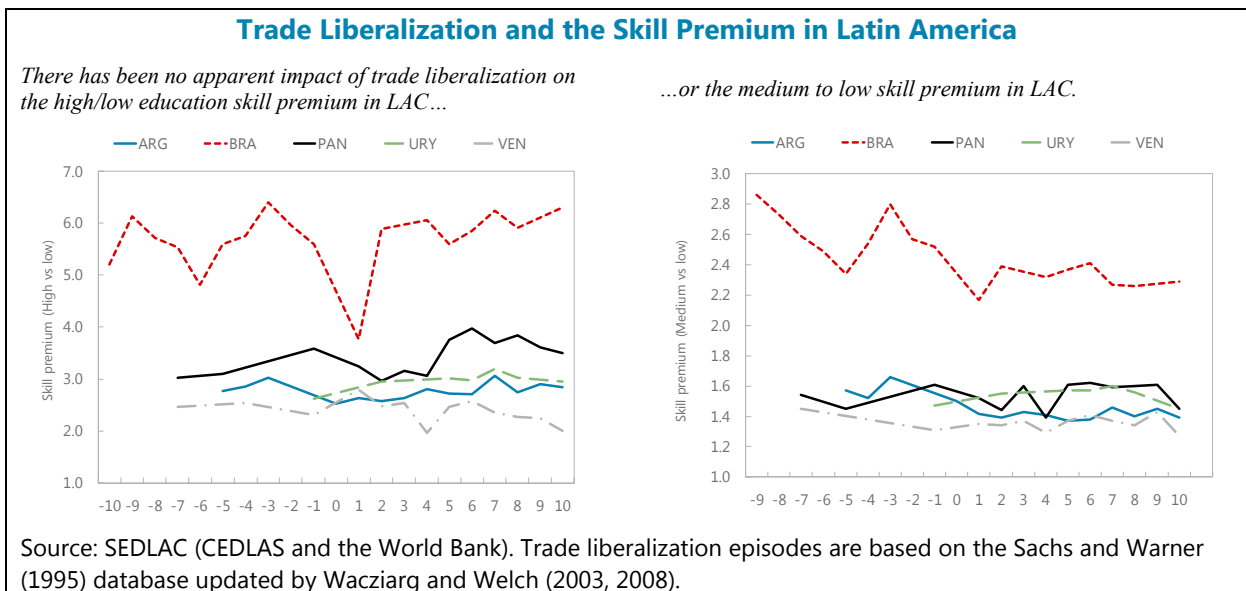
**Table 8: Income Inequality and Liberalization Status, 1970–2015 1/**

<i>Dependent variable</i>	(1)	(2)
	Market Gini	Net Gini
Liberalization	-0.447 (1.203)	0.06 (0.887)
Number of observations	3557	3557
Number of countries	138	138
Adjusted R <sup>2</sup> (within)	0.198	0.14

1/ This table reports the results of fixed effects panel regressions of Gini coefficients on a binary liberalization indicator based on Wacziarg and Welch (2008). All regressions include a time fixed effect. The sample was not restricted to countries that underwent reforms in the sample period. Robust standard errors in parentheses. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.

<sup>35</sup> The large number of gaps in the Gini data prevents us from analyzing annual time series in the event windows as before.

**Consistent with the findings on income inequality, the skill premium does not show a clear trend around trade liberalization episodes experienced by LAC countries.** While there is no global data available with which to examine trends in the skill premium following episodes of trade liberalization, the Socio-Economic Database for Latin America and the Caribbean (SEDLAC) provides data for five Latin American countries: Argentina, Brazil, Panama, Uruguay and Venezuela. The SEDLAC database reports the average hourly wage of low, medium and highly educated workers. The skill premium, defined as the wage ratio of the high/low and medium/low educational groups for LAC countries has varied considerably over time. There is no noticeable break around trade liberalization episodes and the trends in the skill premiums vary by country. However, almost none of the skill premium measures seem to increase after trade liberalization.



#### IV. CONCLUSION

**Results from our complementary approaches consistently suggest that trade openness can promote economic growth without adversely affecting income inequality.**

Cross-country panel results suggest that higher trade openness is associated with higher overall growth even after controlling for a number of other determinants of economic development. Results from event studies around trade liberalization episodes are consistent: on average, growth and capital accumulation seems to have favorable trends immediately after trade liberalization without increasing volatility. Similarly, cross-country panel regressions indicate a negligible or negative effect of trade integration on income inequality. While event studies suggest that trade liberalization leads to structural changes in the economy, average income inequality in liberalizing and non-liberalizing countries followed virtually identical paths.

**There is an opportunity for LAC to leverage trade to promote economic growth without increasing income inequality.** The region's integration remains weak relative to other emerging markets and opportunities to enhance trade could be explored to promote economic

growth. The evidence suggests that enhanced integration, both inter- and intra-regionally, can yield important growth benefits for the region. However, with rising protectionist sentiment in advanced economies, increased regional integration may offer LAC the greatest potential to enhance the growth dividends of trade. Based on the trade characteristics shown to promote economic growth, the region could also usefully focus on efforts to promote trade more generally rather than specific aspects of its trade per se. In this regard, it will be important to continue ongoing regional efforts to strengthen infrastructure and human capital in support of a broader growth strategy. These policies can also pay dividends in terms of enhancing trade integration including through participation in global value chains. Policies to support export quality and promote export diversification can also facilitate further gains from trade.

**More inclusive growth would benefit LAC.** While our analysis suggests that trade can promote economic growth without adversely affecting overall income inequality, trade integration may lead to adjustment costs in particular segments of society and there is a role for LAC to support the adjustment process with targeted social safety nets. In this regard, the gap between the market and net Gini coefficients in LAC relative to other regions suggest that LAC has fallen far behind in terms of the equity of its existing redistributive policies.

## V. REFERENCES

- Autor, D. H., D. Dorn, and G.H. Hanson, 2013, “The China Syndrome: Local Labor Market Effects of Import Competition in the United States,” *American Economic Review*, Vol. 103(6), pp. 2121–68.
- Arellano, M., and S. Bond, 1991, “Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations,” *Review of Economic Studies*, Vol. 58(2), pp. 277-97.
- Arellano, M. and O. Bover, 1995, “Another look at the instrumental variable estimation of error-components models,” *Journal of Econometrics*, Vol. 68(1), pp. 29-51.
- Arnson, C., M. Bergman, and T. Fairfield, 2012, “Taxation and Equality in Latin America,” Woodrow Wilson Center Update on the Americas, June 2012.  
[https://www.wilsoncenter.org/sites/default/files/Taxation\\_0.pdf](https://www.wilsoncenter.org/sites/default/files/Taxation_0.pdf)
- Arora, V. and A. Vamvakidis, 2005, “The Implications of South African Economic Growth for the Rest of Africa,” IMF Working Paper No. 05/58 (Washington: International Monetary Fund).
- Baier, S., and J. Bergstrand, 2007, “Do Free Trade Agreements Actually Increase Members’ International Trade?” *Journal of International Economics*, Vol. 71, pp.72–95.
- Baldarrago, E., and G. Salinas, forthcoming, "Trade Liberalization in Peru: Adjustment Costs Amidst High Labor Mobility," IMF Working Paper, Forthcoming (Washington: International Monetary Fund).
- Baldwin, J. and B. Yan, 2014, “Global Value Chains and the Productivity of Canadian Manufacturing Firms,” Economic Analysis Research Paper Series (Ottawa, Statistics Canada).
- Beaton, K., A. Cebotari, X. Ding, and A. Komaromi, forthcoming, “Trade Integration in Latin American: A Network Perspective,” IMF Working Paper, Forthcoming. (Washington: International Monetary Fund).
- Blundell, R., & S. Bond, 1998, “Initial conditions and moment restrictions in dynamic panel data model,” *Journal of Econometrics*, Vol. 1, pp.115-143.
- Blyde, Juan S. (ed), 2014, *Synchronized Factories: Latin America and the Caribbean in the Era of Global Value Chains*. Washington D.C. Inter-American Development Bank.
- Caselli, F., G. Esquivel, and F. Lefort, 1996, “Reopening the Convergence Debate: A New Look at Cross-Country Growth Empirics,” *Journal of Economic Growth*, Vol. 1(3), pp. 363-89.

- Cerra, V., A. Cuevas, C. Góes, I. Karpowicz, T. Matheson, I. Samaké, and S. Vtyurina, 2016, “Highways to Heaven: Infrastructure Determinants and Trends in Latin America and the Caribbean,” IMF Working Paper No. 16/185 (Washington: International Monetary Fund).
- Cerra, V. and M. Woldemichael, forthcoming, “Put the Pedal to the Metal: Launching Export Accelerations in Latin America and the World,” IMF Working Paper, Forthcoming (Washington: International Monetary Fund).
- Chang, R., L. Kaltani, & N.V. Loayza, 2009, “Openness can be good for growth: The role of policy complementarities,” *Journal of Development Economics*, Vol. 90(1), pp. 33-49.
- Cheng, K., S. Rehmon, D. Senevirathe, and S. Zhang, 2015, “Reaping the Benefits of Global Value Chains,” IMF Working Paper No. 15/204 (Washington: International Monetary Fund).
- Dabla-Norris, E., K. Kochlar, F. Ricka, N. Suphaphiphat, and E. Tsounta, 2015, “Causes and Consequences of Income Inequality: A Global Perspective” IMF Staff Discussion Note No. 15/13 (Washington: International Monetary Fund).
- De la Torre, A., D. Lederman, and S. Pienknagura, 2015, “Doing it Right.” *Finance & Development*, Vol. 52(3).
- De la Torre, A., T. Didier, A. Ize, D. Lederman, and S. Schmukler, 2015, “Latin America and the Rising South, Changing World, Changing Priorities.” World Bank, Washington.
- Ding, X. and M. Hadzi-Vaskov, forthcoming, “Composition of Trade in Latin America and the Caribbean,” IMF Working Paper, Forthcoming (Washington: International Monetary Fund).
- Dollar, D. and A. Kraay, 2004, “Trade, Growth, and Poverty”. *The Economic Journal*, Vol. 114, pp. F22–F49
- Fisher, E., and F. Vega-Redondo, 2006, “The Linchpins of a Modern Economy,” Paper presented at the annual meeting of the American Economic Association, Chicago.
- Frankel, J. A. 1997. *Regional Trading Blocs*. Washington: Institute for International Economics.
- Frankel, J. A., E. Stein, and S-J. Wei, 1995, “Trading Blocs and the Americas: The Natural, the Unnatural, and the Super-Natural,” *Journal of Development Economics*, Vol. 47(1), pp. 61–95.
- Frankel, J.A. and D. Romer, 1999, “Does trade cause growth?” *American Economic Review*, Vol. 89(3). pp. 379-399.

- Friedman, M., and A. J. Schwartz, 1963, "A Monetary History of the United States, 1867-1960," Princeton: Princeton University Press.
- Goldberg, P., 2015, "Review Article: Trade and Inequality", In: Elgar Research Reviews in Economics, Cheltenham, UK: Edward Elgar Publishing Limited
- Goldberg, P. and N. Pavcnik, 2007, "Distributional effects of globalization in developing countries," *Journal of Economic Literature*, Vol. XLV (1), pp. 39-82.
- Hannan, S. A., 2016, "The Impact of Trade Agreements: New Approach, New Insights," IMF Working Paper No. 16/117 (Washington: International Monetary Fund).
- Hausmann, R., C. A. Hidalgo, S. Bustos, M. Coscia, A. Simoers, M.A. Yildirim, 2014, *The Atlas of Economic Complexity*, MIT Press.
- Holtz-Eakin, D., W. Newey, and H.S. Rosen, 1988, "Estimating Vector Autoregressions With Panel Data," *Econometrica*, Vol. 56(6), pp. 1371-1395.
- Hummels, D., R. Jørgensen, J. Munch, and C. Xiang, 2014, "The Wage Effects of Offshoring: Evidence from Danish Matched Worker–Firm Data," *American Economic Review*, Vol. 104 (6), pp. 1597–629
- Inter-American Development Bank, 2016, "Conclusions and Policy Suggestions: The Limits of Counter-Cyclical Policies and Boosting Sustainable Growth", Chapter 7 in *Time to Act: Latin America and the Caribbean Facing Strong Challenges*, Washington D.C.
- International Monetary Fund, 2015, "Trade Integration in Latin America and the Caribbean: Hype, Hope, and Reality," Chapter 4 in *Regional Economic Outlook: Western Hemisphere*, October 2015. Washington DC. REO.
- Jaumotte, F., S. Lall, and C. Papageorgiou, 2013, "Rising Income Inequality: Technology, or Trade and Financial Globalization?" *IMF Economic Review*, Vol, 61 (2), pp. 271–309.
- Kali, R. and J. Reyes, 2007, "The Architecture of Globalization: A Network Approach to International Economic Integration," *Journal of International Business Studies*, Vol. 38(4): 595-620
- Kim, D-H., 2011, "Trade, growth and income," *The Journal of International Trade and Economic Development*. Vol. 20(5).
- Koopman, R., W. Powers, Z. Whang, and S.J. Wei, 2010, "Give Credit Where Credit is Due: Tracing Value Added in Global Production Chains," Working Paper 16426, National Bureau of Economic Research.
- Koopman, R., Z. Wang, and S.-J., Wei, 2014, "Tracing Value-Added and Double Counting in Gross Exports," *American Economic Review*, Vol. 104(2), pp. 459–94.

- Lenzen, M., K.Kanemoto, D.Moran, and A. Geschke, 2012, "Mapping the Structure of the World Economy," *Environmental Science and Technology*, Vol. 46(15), pp. 8374-8381.
- Lenzen, M., K.Kanemoto, D.Moran, and A. Geschke, 2013, "Building Eora: A Global MultiRegion Input-Output Database at High Country and Sector Resolution," *Economic Systems Research*, Vol. 25(1), pp. 20–49.
- Loayza, N., and P. Fajnzylber, 2005, *Economic Growth in Latin America and the Caribbean: Stylized Facts, Explanations, and Forecasts*. Washington, DC: World Bank.
- Mowatt, R., forthcoming "Trade Policy Issues in Latin America and the Caribbean: Views from Country Authorities and Current State of Play," IMF Working Paper, forthcoming. (Washington: International Monetary Fund).
- Newman, M., 2005, "A Measure of Betweenness Centrality Based on Random Walks," *Social Networks*, Vol. 27 (1), pp. 39–54.
- United Nations, 2015, "Global Value Chains and Development: Investment and Value Added Trade in the Global Economy".
- Rodríguez, F., and D. Rodrik, 2001, *Trade Policy and Economic Growth: A Skeptic's Guide to the Cross National Evidence*. Cambridge, MA: MIT Press.
- Romer, C.D. and D. H. Romer, 1989, "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," NBER Macroeconomics Annual 1989, Vol. 4, pp. 121-184.
- Sachs, J. D., and A. Warner, 1995, "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity*, Vol. 1, pp. 1–118.
- Solow, R., 1956, "A Contribution to the Theory of Economic Growth," *The Quarterly Journal of Economics*, Vol. 70(1), pp. 65-94.
- Wacziarg, R. and K. H. Welch, 2003, "Trade Liberalization and Growth: New Evidence," NBER Working Paper 10152. Cambridge, Mass.: National Bureau of Economic Research.
- Wacziarg, R. and K.H. Welch, 2008, "Trade Liberalization and Growth: New Evidence." *World Bank Economic Review*, Vol. 22 (2), pp. 187-231
- Wood, A., 1995, "How Trade Hurt Unskilled Workers," *Journal of Economic Perspectives*, Vol. 9 (3), pp. 57–80

## ANNEX I. DATA SOURCES

Indicator	Description	Source
<b>Trade Integration and Economic Growth</b>		
GDP	GDP per capita based on real GDP per capita PPP measured in 2005 constant dollars	Penn World Tables
Labor force education	Percentage of population older than 15 years that attained secondary or tertiary schooling.	Barro-Lee education attainment dataset
Terms of trade	Ratio of export unit value indexes to import unit value indexes	Penn World Tables
Public Infrastructure	Average number of telephone lines per capita	World Bank's World Development Indicators
Trade openness	Exports plus imports (goods and services) in percent of GDP	IMF World Economic Outlook database, Penn World Tables
Foreign direct investment	FDI inflows in percent of GDP	IMF Balance of Payments Statistics
<b>International Trade Connectivity</b>		
Total degree	Total number of trading partners (export and import)	IMF Direction of Trade Statistics. Estimates from Beaton, Cebotari, Ding and Komaromi (forthcoming).
In degree	Total number of countries import from	IMF Direction of Trade Statistics. Estimates from Beaton, Cebotari, Ding and Komaromi (forthcoming).
Out degree	Total number of countries export to	IMF Direction of Trade Statistics. Estimates from Beaton, Cebotari, Ding and Komaromi (forthcoming).
Eigencentrality	Eigencentrality in the world trade network	IMF Direction of Trade Statistics. Estimates from Beaton, Cebotari, Ding and Komaromi (forthcoming).
<b>Global Value Chains</b>		
Total GVC participation	Sum of foreign value-added indirect value-added in gross exports	Eora Multi Region Input Output (MRIO) table (Lenzen, Kanemoto, Moran and Geschke 2012 and Lenzen, Moran, Kanemoto and Geschke 2013) based on Koopman, Wang, and Wei (2014)'s decomposition of gross exports.
Foreign value-added	Foreign value-added in gross exports	Eora Multi Region Input Output (MRIO) table (Lenzen, Kanemoto, Moran and Geschke 2012 and Lenzen, Moran, Kanemoto and Geschke 2013) based on Koopman, Wang, and Wei (2014)'s decomposition of gross exports.
Indirect value-added	Value of exported goods used as imported inputs by other countries to produce their exports	Eora Multi Region Input Output (MRIO) table (Lenzen, Kanemoto, Moran and Geschke 2012 and Lenzen, Moran, Kanemoto and Geschke 2013) based on Koopman, Wang, and Wei (2014)'s decomposition of gross exports.
Domestic value-added in intermediate goods production re-exported to third countries	Domestic value-added in intermediate goods production re-exported to third countries	Eora Multi Region Input Output (MRIO) table (Lenzen, Kanemoto, Moran and Geschke 2012 and Lenzen, Moran, Kanemoto and Geschke 2013) based on Koopman, Wang, and Wei (2014)'s decomposition of gross exports.
<b>Export Markets</b>		
Intra-regional exports	Calculated as a share of country's exports.	Calculations based on IMF Direction of Trade Statistics.
Exports to advanced economies	Calculated as a share of country's exports.	Calculations based on IMF Direction of Trade Statistics.
Most central countries in the world trade network	Calculated as a share of country's exports with three most central countries in the world trade network - the countries with the highest values of eigencentrality. Classification made for every year in the sample period.	Calculations based on IMF Direction of Trade Statistics.
Concentration of trade with three largest trading partners	Calculated as a share of country's exports with its three largest trading partners (exports). Classification made for every year in the sample period.	Calculations based on IMF Direction of Trade Statistics.
Export market diversification (HH index)	Herfindalh-Hirshman Index	Calculations based on IMF Direction of Trade Statistics.
Number of trading partners with a trade agreement	Number of trade agreements.	National Science Foundation-Kellogg Institute database on economic integration agreements compiled by Bergstrand.



### Annex I: Data Sources (continued)

<b>Export Products</b>		
Export quality	Higher values of the export quality index indicate higher export quality.	IMF Export Quality Index
Export concentration index	Higher values of the diversification index indicate lower (higher) diversification)	IMF Export Diversification Index
Economic complexity index	Higher values of the economic complexity index indicate higher complexity of the products produced by a given country.	Observatory of Economic Complexity
<b>Inequality</b>		
Market Gini	Gini index of distribution of income before taxes and transfers	Standardized World Income Inequality database
Net Gini	Gini index of distribution of income after taxes and transfers	Standardized World Income Inequality database
Share of agriculture in value-added		World Bank's World Development Indicators
Share of services in value-added		World Bank's World Development Indicators
Share of industry in value-added		World Bank's World Development Indicators
Financial openness	Sum of foreign assets and liabilities relative to GDP.	External Wealth of Nations Database: updated and extended version of the Lane and Milesi-Ferretti (2007) dataset. IMF World Economic Outlook database.
Financial deepening	Ratio of private credit to GDP	World Bank's World Development Indicators
Education	Average years of schooling	Barro-Lee education attainment dataset.
Government spending	Fraser Institute index that measures total government spending as a share of GDP.	Fraser Institute
Trade liberalization dates		Sachs and Warner (1995) updated by Wacziarg and Welch (2003, 2008)

**Table A1: International Trade Connectivity and Economic Growth 1/**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Initial GDP per capita	-3.754*** (0.626)	-3.491*** (0.579)	-3.362*** (0.561)	-3.733*** (0.654)	-3.779*** (0.636)	-3.706*** (0.615)	-3.895*** (0.640)	-3.637*** (0.603)	-3.469*** (0.588)	-2.985*** (0.609)	-2.914*** (0.549)	-3.145*** (0.574)	-3.348*** (0.633)	-3.184*** (0.536)
Labor force education	-0.211 (0.562)	-0.336 (0.527)	-0.00321 (0.600)	-0.104 (0.593)	-0.134 (0.587)	-0.206 (0.556)	-0.217 (0.594)	-0.124 (0.552)	0.102 (0.598)	0.221 (0.503)	0.225 (0.487)	0.146 (0.552)	0.0502 (0.546)	0.223 (0.559)
Terms of trade	-11.24*** (3.006)	-11.44*** (3.042)	-7.934** (3.132)	-8.192** (3.281)	-9.247*** (3.201)	-10.75*** (3.046)	-10.65*** (3.106)	-11.58*** (3.149)	-8.707*** (3.052)	-3.147 (2.418)	-4.789* (2.557)	-3.715* (2.039)	-6.124** (2.543)	-3.910** (1.814)
Public Infrastructure	1.651*** (0.404)	1.577*** (0.371)	1.788*** (0.359)	1.894*** (0.384)	1.813*** (0.389)	1.658*** (0.401)	1.768*** (0.390)	1.511*** (0.416)	1.775*** (0.369)	1.479*** (0.382)	1.036*** (0.388)	1.596*** (0.343)	1.364*** (0.370)	1.600*** (0.337)
Trade openness	1.255* (0.654)	1.028* (0.608)	1.185* (0.617)	1.424** (0.621)	1.457** (0.601)	1.328** (0.621)	1.461** (0.628)	1.333** (0.660)	1.336** (0.663)	1.561** (0.664)	1.059* (0.602)	1.147* (0.608)	1.307** (0.648)	1.244** (0.611)
FDI (percent of GDP)	0.636** (0.261)	0.672*** (0.243)	0.647*** (0.251)	0.745*** (0.253)	0.713*** (0.257)	0.649** (0.257)	0.677*** (0.262)	0.543** (0.269)	0.638*** (0.231)	0.403* (0.239)	0.456* (0.238)	0.507** (0.230)	0.423* (0.254)	0.489** (0.228)
Number of countries import from (In Degree)		3.992 (3.086)												
Number of countries export to (Out Degree)		3.846* (2.232)												
Number of trading partners (Total degree)	7.695*** (2.294)													
In strength			-0.205 (5.178)											
Out strength			3.291 (3.092)											
Betweenness centrality				2.525** (1.224)										
Out betweenness centrality					2.936** (1.149)									
Closeness						11.79*** (3.714)								
Out closeness							10.14*** (3.285)							
Eigencentrality								9.787*** (2.500)						
Out eigencentrality									-5.719 (4.529)					
In eigencentrality									10.50 (6.676)					
Power centrality										-7.292** (3.488)				
Authority score											9.857*** (2.889)			
Authority score weighted												6.193 (4.278)		
Hub score													6.567*** (1.921)	
Hub score weighted														4.197* (2.255)
Observations	829	829	829	829	829	829	829	829	829	829	829	829	829	829
Number of ISO	131	131	131	131	131	131	131	131	131	131	131	131	131	131
AR(1)	0.0595	0.0615	0.0626	0.0593	0.0595	0.0587	0.0620	0.0561	0.0645	0.0175	0.0292	0.0317	0.0331	0.0329
AR(2)	0.390	0.392	0.411	0.407	0.406	0.402	0.400	0.395	0.409	0.354	0.326	0.364	0.322	0.359
Hansen	0.199	0.399	0.557	0.217	0.231	0.182	0.167	0.171	0.544	0.768	0.680	0.818	0.618	0.708

1/ This table reports the results of regressions of growth in real GDP per capita on various indicators of trade connectivity based on network theory using system GMM. All regressions include time fixed effects. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.